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LNG trade will struggle to absorb new supply in absence of more shutdowns

International Energy Agency says oversupply situation is worsening and will last to 2019

The oversupply situation in liquefied natural gas markets that emerged in 2015 is worsening in 2016 and will not substantially improve until 2019 at the earliest, according to the latest analysis by the International Energy Agency.

Late 2015 and early 2016 saw four large liquefaction projects entering the market with their additional volumes being placed into an already large overhang of supply.

Capacity

"As these plants ramp up and others come on stream, annual capacity additions will run in the region of 30 billion cubic metres to 40 Bcm between 2016 and 2018," the IEA said.

"This is roughly equivalent to the capacity added over the entire four-year period 2012-15," the IEA report on the medium-term natural gas market explained.

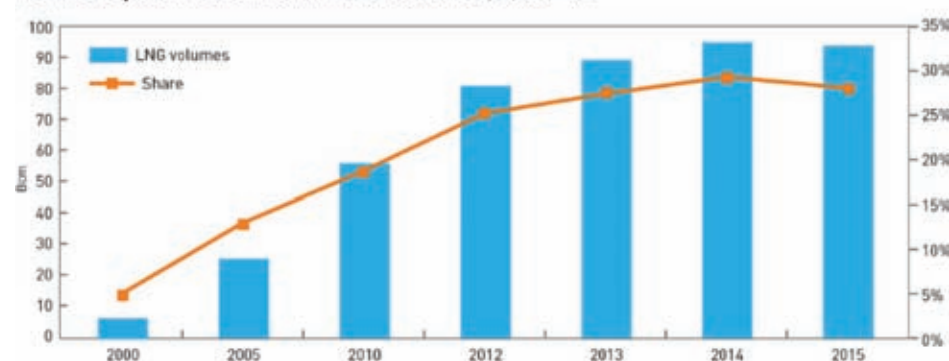
"In the absence of any significant supply disruption, markets will struggle to absorb these incremental supplies," it said.

Europe, traditionally the outlet of last resort for unwanted LNG supplies, has limited absorption capabilities. While regional import requirements will increase, stable flows from Russia (under the assumption that it will choose to defend its market share) will put a cap on the region's LNG imports.

In 2015, 333.5 Bcm of LNG was produced globally in 17 countries. This represents a 2.5 percent increase relative to 2014. Just two new projects came on line (both in the second half of the year) and much of the growth was the result of production ramping up at the Australia Queensland Curtis LNG and Papua New Guinea (PNG) projects, which started operations in 2014.

The IEA noted that production losses also weighed on net growth.

Trend of spot and short-term LNG contracts, 2000 -15



Source: IEA analysis based on 2006-16 GIIGNL data, www.giignl.org/publications; IEA estimates.

Evolution of agreements for short-term deliveries

"Supply outages remained very elevated in 2015. Egypt recorded no exports due to persistent problems with availability of feed gas, and Angola did the same because of problems with technical operations," it said.

"Adding to these long-standing issues, Yemen LNG (with a capacity of 9.1 Bcm) went off line in April 2015, due to a sharp degradation in the country's security situation. Total, the operator of the plant, decided to halt production and exports and evacuate personnel," the report explained.

The total capacity of the three projects is 32.8 Bcm, which accounts for roughly 8 percent of global LNG export capacity.

"Adding to this the chronic underutilisation of Algerian and Indonesian plants (mainly the result of feed-gas issues), there is a clear trend of growing LNG capacity off line," it stated.

Looking at the import side, 2015 saw several players joining the club of LNG importers. Pakistan, Egypt, Jordan and Poland all started importing LNG in 2015, bringing the total number of LNG-importing countries to 35.

"With Egypt commencing LNG imports, Africa, alongside other major regional aggregates, now also figures as an LNG importer. The number of LNG-importing countries has doubled over the

past 10 years, and tripled over the past 15.

Reach

"As is the case for exports, LNG imports are becoming more widespread," the IEA said.

The report also forecasts that Japan and Korea - which account for around 50 percent of global LNG imports - will face pronounced changes in their demand dynamics.

Taken together, they accounted for almost half of global LNG import growth during the past six years. Yet their imports are set to stagnate, at best, or decline sharply, at worse, over the forecast horizon of the IEA report, depending heavily on the rate of the nuclear comeback in Japan.

The IEA also sees Latin America and the Middle East offering potential pockets of growth.

Yet neither of these regions is a natural home market for LNG imports. In Latin America, slower growth in electricity generation in Brazil, in combination with robust growth in renewables production (mainly on the back of hydro), will sharply lower Brazil's LNG import needs.

"Imports will grow elsewhere but will not offset the loss of Brazilian volumes," it said.

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“In the Middle East, the largest regional consumers (Saudi Arabia and Iran) are, and will remain, largely isolated markets with no LNG trade connection over the forecast horizon of this report,” the IEA stated.

Balances

“Higher imports from Kuwait and lower exports from Oman (due to the lack of feed-gas) will tighten regional balances but will not be a decisive swing factor on a global scale,” it added.

It is clear that non-OECD Asia (including China) will play a critical role in absorbing the large projected supply increase over the next six years.

The report projects that the Asia region will increase imports by more than 110 Bcm (effectively taking up 80 percent of additional supply) with growth spurred by the availability of cheap supplies.

The report also examined the continuing impact of lower prices that began to set in from 2014.

“Generally, as spot gas prices remain under pressure, buyers will try to obtain better pricing and non-pricing terms from sellers.

“The tendency will be towards shorter contract duration, full destination flexibility and, particularly as oil prices start recovering, lower oil slopes.

“Customers’ search for higher levels of flexibility (both for pricing and non-pricing terms) could also impact renegotiations in contract renewals. This report estimates that in the Asia-Pacific region, up to 50 Bcm of contracts will expire by 2021.

“While growing demand in Southeast Asia (Indonesia and Malaysia) suggests that part of those contracted volumes will not be renewed (but instead be diverted to use in the producing countries), the bulk of them will be looking for customers,” it added.

Increasing competition across the producer nations will also put pressure on suppliers to agree to less rigid contract structures.

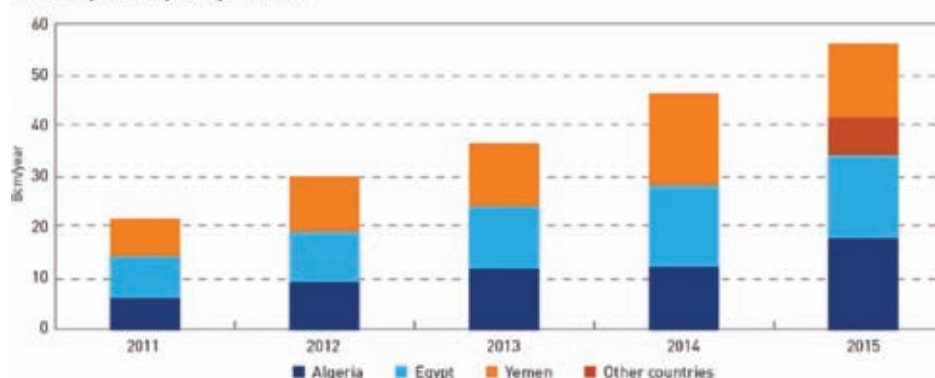
Investment

There is also ongoing investment in LNG export ventures and import infrastructure.

In 2016, six projects with capacity of almost 50 Bcm started operations.

Australia Pacific LNG, the third and last coal-seam-gas-fed LNG project on Australia’s eastern coast started production in December 2015 with its first cargo shipped to China in January 2016.

LNG export capacity off line



Some production plants have been suffering shutdowns

The project’s total capacity is 12.2 Bcm per year. Roughly 85 percent of it is committed to China’s Sinopec (which also holds a quarter of the project equity), based on a 20-year long-term contract starting from this year.

Once Australia’s three CSG projects are fully operational, the country’s export capacity will rank as the world’s second-largest, behind only Qatar.

The first Train of Sabine Pass LNG in the United States exported its first cargo in February 2016.

Cheniere Energy, the operator, is developing the liquefaction complex adjacent to existing regasification facilities.

Build-out

The project plans to have six Trains with capacity of 6.1 Bcm per year each. “Five of them have already taken FID and are under construction. Sabine Pass is the first in a wave of new LNG facilities expected to come on line in the US.

“Cheniere Energy is also developing the Corpus Christi LNG project, located roughly 500km from Sabine Pass, also on the US Gulf Coast.

“The company is planning to ultimately operate 11 Trains with total export capacity of 67 Bcm per year, across these two projects alone,” the IEA noted.

“Gorgon LNG was the third and last project to start up in the first quarter of 2016. With capacity of 21.2 Bcm per year (Trains 1-3), Gorgon is one of the world’s largest natural gas projects and the largest single resource development in Australia.

“It took roughly six years for the project to come on line, with construction starting in 2009. Gorgon is known for introducing one of the world’s largest carbon capture and storage (CCS) projects, with facilities to inject and store 3-4 million tonnes per year (Mt/yr) of carbon dioxide (CO₂) into a deep reservoir unit more than 2km beneath

Barrow Island, where the LNG plant is located,” the report explained.

Slowdown

“After a four-year period that saw around 35 Bcm of LNG capacity taking final investment decisions (FIDs) annually, 2015 registered a marked slowdown in new investment decisions.

“Four projects with total capacity of just around 25 Bcm were sanctioned last year. Two of them were for additional trains at facilities already under construction, which means that there were only two purely greenfield projects, namely Corpus Christi LNG and Cameroon Floating LNG (FLNG), which got the green light in 2015.

“Many other planned projects, originally intended to take FID in 2015, were pushed back amid falling prices and deteriorating market conditions.

“Pacific NorthWest LNG in Canada announced a conditional FID in mid-2015. However, FID has not been taken and the project seems likely to be delayed.

“The announcement of the FID for the Cameroon FLNG project in 2015 came as a surprise to many.

“The project will adopt FLNG technology for the development of offshore reserves located roughly 20km from the coast of Cameroon.

“The construction of the floating platform has already started in Singapore, and it is expected to start production in the first half of 2017. The project will be the first FLNG project in Africa.

“In contrast to Cameroon FLNG, Eni’s Coral FLNG, which was originally expected to take FID in 2015, has been delayed.

Floating

“In early 2016, the Mozambican government approved the Eni plan for development of Coral gas and the FLNG project. Eni has subsequently stated it still expects to take FID this year.



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“Today, 151 Bcm of capacity is under construction globally (excluding the ramp-up of new trains at projects that have just started operations). Roughly 75 percent of the additional capacity is located in the US and Australia,” the IEA said.

Three new projects under construction are designed as FLNG. Two of them, Prelude FLNG in Australia and PFLNG SATU in Malaysia, are vessels designed to operate in open ocean and withstand major hurricanes (up to Category 5).

“As a result, they require complex designs and are more capital-intensive than those vessels projected to operate near shore in relatively benign environments.

The “PFLNG Satu” liquefaction hull built for Petronas should start operations this year, potentially making it the first operational floating liquefaction project in the world.

“Overall, there are signs that lower oil prices are taking a toll on the development of new floating liquefaction facilities. Petronas recently announced that it is delaying indefinitely construction of a second facility, despite the vessel being already under

construction at a shipyard in South Korea,” the report added.

On offer

Similarly, CFLNG, originally destined for Colombia and almost ready to be delivered, is now looking for a new home after a decision by Pacific Exploration and Production to cancel the project.

“In a further ominous sign, Hoegh LNG - a company specialising in floating technology - recently announced that it is placing its floating liquefaction activities on hold, focusing instead on the regasification side of the business,” it said.

There is currently more than 107 Bcm of new regasification capacity under construction globally that will open up new markets in nations such as Colombia, Ghana, the Philippines and Uruguay.

This is likely to mean LNG cargo oversupply being targeted at these markets as well as countries such as China that is still finding its level of supply and where 35 percent of regasification infrastructure is targeted.

“China already has 13 operating LNG terminals with total capacity of 56 Bcm and an average utilisation rate of around 50 percent.



Spread of LNG import terminal and plants in the Asian-Pacific region

“In aggregate, therefore, import infrastructure is not a key obstacle to increasing China’s LNG imports.

“While some of the new 39 Bcm of capacity under construction will be built in areas currently not served by existing facilities, the vast majority will,” the IEA stated.

up of the Dunkirk terminal will offer further operational flexibility in North West Europe, it will clearly not open new pockets of demand,” the IEA said.

Two LNG regasification terminals are currently under construction in Finland. They both are small scale, with total capacity of around 0.8 Bcm per year. The projects will supply LNG for shipping, industrial and heavy-duty land transport needs.

“Particularly, LNG usage in maritime transport for bunkering is expected to be a growing market due to emissions regulation requirements in that region.

Finland

“Once the Pori LNG terminal comes on line at the end of this year, Finland will become an LNG importer for the first time.

“In the longer term, more countries are likely to emerge as LNG importers, such as Bangladesh, the Philippines and Vietnam. New import facilities could potentially also emerge in Africa.

“Lower prices will make potential buyers more prone to tap into imports, while oversupply and slow demand from traditional consumers will push suppliers to take on more risk and chase smaller, less credit-worthy customers.

“With FSRUs and small-scale terminals becoming more popular, starting LNG imports is becoming a much faster process. This report expects the opening up of new markets - particularly post-2018 - to become a helpful factor towards market rebalancing,” the IEA said.

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Traders entering the LNG sphere as new players with experience of commodities

IEA turns spotlight on trading activities, derivatives and the main Russian project

The first LNG transaction by these international traders goes back eight years, when Switzerland-based Vitol, the world’s largest independent oil trader, entered the LNG business.

Since then, the company has been constantly engaging with many LNG buyers around the world to sell LNG cargoes by short-term and midterm basis contracts.

Kuwait accord

When the company signed a four-year LNG supply deal with Kuwait Petroleum Corporation (KPC) in 2010, this was ground-breaking, as Vitol entered into a mid-term deal without having its own supply source, whereas in conventional LNG sales it was usual for sellers to source LNG supplies from their own LNG projects.

The International Energy Agency noted in its recent medium-term natural gas market report that participation by international traders in the LNG market picked up after 2010, when regional gas prices started to widen, especially caused by the surge of Asian gas prices.

“This situation created an arbitrage opportunity in LNG markets, leading international traders to venture into the business. As the price spread between Asia and the United States widened, international traders could purchase LNG from producers or resellers in Europe or the United States and sell it to eager Asian buyers,” the IEA said.

Participation by international traders in the LNG market was not only due to regional price gaps.

“The emergence of new demand such as that in the Middle East, Latin America and non-OECD Asia created opportunities to international traders.

“Demand in these new regions was volatile and buyers in these regions were often unable to commit to long-term contracts. Therefore, the presence of international traders who deal predominantly with short-term and medium-term contracts was welcomed.

“Conversely, international traders pursued business opportunities in these emerging countries by taking the risk in these niche markets to compete with traditional major oil and gas companies,” the report added.

“The success in LNG trading was also supported by their sales channels, already constructed on the basis of energy or other commodities, and through existing business knowledge.

“For example, the LNG supply deal was made between Vitol and KPC in 2010, but the business relationship between these two companies already existed via the oil trading business.

“It is of note that the emergence of these international traders in LNG markets brought fresh impetus to the LNG industry, and has contributed to enhance liquidity in spot markets. The more the LNG industry expands and moves towards flexible and liquid markets, the

more opportunities there will be for traders to strengthen their position in the LNG market,” it stated.

Derivatives

Another development covered by the IEA in its latest report was the Singapore LNG derivatives market.

It said the European-based commodities trader Trafigura and Singapore’s Pavilion Gas on January 25, 2016, made the first trade on the newly launched Singapore

MAJOR LNG TRADERS AND RECENT CONTRACTS			
Trader	Country (head office)	Buyer	Recent contract
Vitol	Switzerland	Egypt	9 LNG cargoes during 2015-17
Trafigura	Switzerland	Egypt	33 LNG cargoes during 2015-16
Koch	United States	Nigeria	6 LNG cargoes from Enel
Gunvor	Switzerland	Pakistan	3 LNG cargoes from Aug. to Oct. 2015
Noble Group	Hong Kong, China	Egypt	7 LNG cargoes during 2015-17

Commodities industry is building up its presence in LNG sector

Exchange (SGX) SLInG (SLInG is short for Singapore SGX LNG Index Group) derivatives contract for 10,000 million British thermal units of free-on-board (FOB) LNG swaps for March.

Assessment

“This small transaction (the minimum quantity of gas tradable on the FOB Singapore SLInG) was estimated to be worth around \$50,000 and served as the first example of how the market might function.

“A second trade was concluded at the end of March 2016,” it added.

The SLInG derivatives contracts are based on a spot-price index of the same name jointly developed by SGX and its subsidiary Energy Market Company (EMC).

The SLInG index is an industry-led pricing benchmark that assesses prices for a virtual point off Singapore based on a simple average of participant assessments submitted each week, after excluding outliers in the upper and lower 15 percent region.

In the future, prices from other key FOB and delivered ex-ship (DES) transactions may be incorporated into the SLInG’s assessment.

“Industry participants are responsible for assessing their own prices for the cargo, including the netback and net forward calculations, and the cost of freight.

“By allowing market participants to adjust the price of transactions to account for freight costs, the SLInG-indexed trades can include those that do not necessarily involve a physical cargo being offloaded or stored in Singapore LNG terminals,” the IEA explained.

“Since the development of the SLInG index in September 2014, the number of industry participants involved has grown from 5 to 22 private participants. “The

composition of participants includes oil and gas majors, LNG/gas producers, traders, and importers located in several key FOB and DES regions around the world,” the report added.

The SGX is currently working to increase the number of participants in both the underlying index and its derivatives market.

While the weekly index assessments will continue to rely on industry participants, the SGX is in discussions with many banks with commodity trading functions, with the view to increasing liquidity in the SGX SLInG derivatives market.

SGX is not the only Asian trading group developing LNG derivatives contracts; Japan’s CME Group also initiated similar efforts in 2015 and subsequently launched a new LNG DES Japan (Rim) futures contract that began trading on 22 February 2016.

The LNG DES Japan (Rim) futures contracts can be traded through the Japan OTC Exchange as well as through other brokers, and cleared through CME.

These contracts will likewise be 10 000 MMBtu in size, and be cash-settled with reference to the Spot LNG Price Assessment. The LNG DES Japan futures are listed on the New York Mercantile Exchange (Nymex).

Spot market

The launch of the two derivatives markets in early 2016 marks an important step in the development of Asian LNG spot trading.

“It clearly highlights Asian buyers’ desire to negotiate more fundamental reflective prices for gas, decoupled from oil,” the IEA said.

“Boosting liquidity through derivative trading is an important part in the growth process of any commodity-trading

Boosting liquidity through derivative trading is an important part in the growth process of any commodity-trading hub.

hub. Yet whether underlying spot trading is mature enough to attract large-scale interest in derivative transactions remains to be seen," it added.

In a further addition to its forecasts and overviews, the IEA said that on the LNG supply side, the Yamal project in Arctic Russia was the only project with a real chance of being launched during the forecast horizon of the report.

"All other LNG projects have been deferred, some indefinitely. Lower oil and gas prices and severe financial difficulties have dampened the 'LNG fever' that had spread among Russian companies in recent years.

"Costs have also increased sharply due to the ruble depreciation, as Russia needs to buy much of its LNG equipment on the international market (where it is priced in US dollars).

Timeline

"This report assumes that the first and second trains of Yamal LNG will be launched before 2021, though with a delayed timeline compared with the official one provided by operator Novatek," it added.

Yamal LNG announced in April 2016 that a loan agreement with the Export-Import Bank of China and the China Development Bank had been signed.

Together with financing provided by the National Wealth Fund, credit lines from Sberbank and Gazprombank and funding from CNPC, the Silk Road Fund and Total, the project finally secured the total amount of funding required, estimated at around \$27 billion.

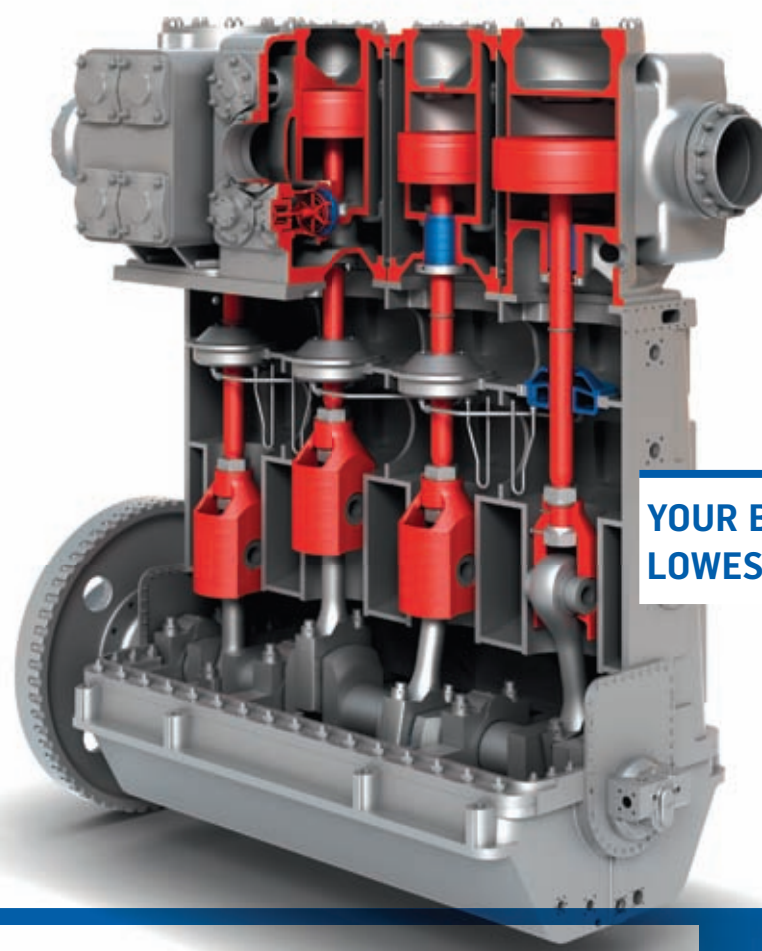
While Gazprom has postponed its plans to build new LNG facilities, it is working on expanding its LNG trading business.

In 2015, Gazprom Marketing & Trading Singapore signed a long-term sales and purchase agreement with Yamal LNG for the supply of 3.9 Bcm over

20 years, aiming to sell to the Asia-Pacific region, primarily India.

"This was followed by an SPA with Cameroon LNG for 1.6 Bcm over

eight years. By the end of the forecast period, Gazprom's LNG trading business is expected to increase further," it added. ■



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For the Record

AKER SOLUTIONS of Norway has won an order to supply key equipment for the development of Egypt's largest offshore natural gas discovery being developed by Italian operator Eni as a gas hub for the East Mediterranean and ending the nation's need for LNG imports. Aker said the Egyptian contract would see the delivery of its longest-ever umbilicals system for the Zohr gas field offshore the Egyptian city of Alexandria. Umbilicals play an increasingly important role in offshore and subsea oil and gas developments. They contain electric cables and other connections to the surface to enable the development and control of subsea wells. Aker said the agreement with Petrobel in Egypt was worth more than 1 billion Norwegian crowns (\$122 million). Eni was given the go-ahead in February 2016 by the Egyptian Ministry of Petroleum and Mineral Resources to develop the Zohr field. The Eni discovery will go some way to satisfying Egypt's domestic natural gas needs, while possibly helping to revitalize its two liquefied natural gas export plants. The Egyptians stopped producing LNG three years ago as natural gas supplies were diverted by the state energy companies to satisfy pipeline high demand in the domestic market. Even the existing gas resources were not sufficient and the Egyptians had begun importing LNG when Eni's Zohr discovery was made in August 2015. The Aker contract involves the delivery of 180 kilometres of steel tube umbilicals that will connect the Zohr subsea development to an offshore control platform. Petrobel, a joint venture between the Egyptian General Petroleum Corp. (EGPC) and Eni, is responsible for the development and operations at Zohr. "Aker Solutions is building on its previous experience offshore Egypt to now deliver its largest-ever umbilicals project," said Luis Araujo, Chief Executive. "We are very pleased to support Petrobel and Egypt on this important development," Araujo stated. The work will be led by Aker Solutions' subsea division in Oslo and manufacturing will start immediately at the umbilicals plant in Moss, Norway. "The company has invested substantially in the Moss facility over the

past years. The plant has more than 20 years of experience in making the most advanced and complex umbilical systems, which are used to transport data, power and liquids between oil and gas installations on the seafloor and facilities onshore or on platforms," Aker said. The Norwegian company estimated that the umbilicals system would be delivered by mid-April 2017. Eni recently performed production tests on its Zohr discovery, saying the field has "a great production capacity" and would form the basis of the Arab nation's planned natural gas hub. Eni said that during the tests, 120 metres of the Zohr field reservoir were opened to production in the Shorouk block offshore Egypt. "The well, constrained by surface facilities, delivered up to 44 million standard cubic feet per day (MMscfd) of gas," Eni said. "The comprehensive set of data collected and analysed has proved that the well has a great production capacity, which is estimated in a deliverability of up to 250 MMScf/d in production configuration, or 46,000 barrels of oil equivalent per day," the Italian company stated. Eni holds 100 percent of the Shorouk licence and operations are being conducted with the Petrobel joint venture. Eni said the Zohr development plan envisages the start of production by the end of 2017, just two years after the discovery, with a progressive ramp up of output.

ALASKA Governor Bill Walker has called the state legislature into a special session in the capital Juneau on July 11 to consider special budget measures and oil and gas bill that will have a bearing on the economics of the Alaska liquefied natural gas project. Alaska is in the midst of deficit crisis during an important year for the Alaska LNG project in terms of making regulatory and financial progress. "There is an act relating to the oil and gas production tax, tax payments, and credits, oil and gas lease expenditures, production tax credits and interest applicable to delinquent taxes," a statement said. The special session will also address issues such as personal income tax, a sales tax and issues relating to the Alaska Permanent Fund. Walker has called legislators back for what will be the second special session of 2016 after five months of work in a regular and first special session, which failed to yield legislative consensus on the Walker's special deficit-reduction package. The Alaska Senate passed a rewritten version of Walker's legislation in a 14-5 vote earlier in June, though the

House adjourned on June 18 without considering the bill. This forced Walker to call another special legislative session. The Alaska state shareholding company in the LNG project on June 9 named former Cheniere Energy President Keith Meyer as its new head. Meyer took up his role as President of Alaska Gasline Development Corp. (AGDC), owner of a 25 percent interest in the state's Alaska LNG joint venture with ExxonMobil, ConocoPhillips and BP of the UK. AGDC appointed Meyer after a board meeting in Anchorage following a five-month national search initiated in December 2015 to fill the job previously held by Dan Fauske. Under current plans for Alaska LNG, the three oil companies and AGDC are aiming to construct three liquefaction Trains at Nikiski in south-central Alaska to process up to 20 million tonnes per annum of LNG and with three 160,000 cubic metres capacity storage tanks alongside. The proposals include delivering the gas from the North Slope region using an 800-mile, 42-inches diameter pipeline with up to eight compressor stations along the way. The pipeline will have a capacity of 3.3 billion cubic feet of Alaskan natural gas per day. The four Alaska LNG project partners have been carrying out preliminary engineering and design work on aspects of the liquefaction plant and storage facilities, as well as the pipeline. This additional information will be forwarded to the US Federal Energy Regulatory Commission as part of the ongoing permitting process. "Alaska is engaged in one of the largest energy projects in North America. I'm excited by the challenge and incredibly honored by the trust and confidence the board is placing in me," said Meyer in June. "I understand how vital the gas pipeline and LNG project are to our Alaskan economy and I'm committed to getting them built," he had stated.

ALASKA LNG project shareholder, Alaska Gasline Development Corp. (AGDC), has named former Cheniere Energy President Keith Meyer as its new head. Meyer is taking up his role as President of AGDC, owner of a 25 percent interest in the Alaska LNG joint venture with ExxonMobil, ConocoPhillips and BP of the UK, from June 15, 2016. AGDC appointed Meyer after a board meeting in Anchorage following a five-month national search initiated in December 2015 following the resignation of incumbent Dan Fauske. Meyer left Cheniere in November 2007 while it was still an import terminal

operator in Louisiana and before the project began to construct the Sabine Pass liquefaction plant that became the first US commercial exporter from the Gulf Coast in February 2016. He joins AGDC from LNG America, an energy logistics company he founded in 2008 to provide LNG distribution as a fuel source within the marine, transportation and other industries. Under current plans for Alaska LNG, the three oil companies and AGDC are aiming to construct three liquefaction Trains at Nikiski in south-central Alaska to process up to 20 million tonnes per annum of LNG and with three 160,000 cubic metres capacity storage tanks alongside. The proposals include delivering the gas from the North Slope region using an 800-mile, 42-inches diameter pipeline with up to eight compressor stations along the way. The pipeline will have a capacity of 3.3 billion cubic feet of Alaskan natural gas per day. The four Alaska LNG project partners have been carrying out preliminary engineering and design work on aspects of the liquefaction plant and storage facilities, as well as the pipeline. This additional information will be forwarded to the US Federal Energy Regulatory Commission as part of the ongoing permitting process. "Alaska is engaged in one of the largest energy projects in North America. I'm excited by the challenge and incredibly honored by the trust and confidence the board is placing in me," said Meyer. "I understand how vital the gas pipeline and LNG project are to our Alaskan economy and I'm committed to getting them built," he stated. In March 2016, Meyer had been placed under contract to advise AGDC on project and commercial activities, "allowing the board time to further evaluate" his qualifications, the statement said. "Keith's contribution will be immediate and impactful. He's a proven leader who understands what's at stake in Alaska, and possesses the skills and experience we need at this critical time in the development of our natural gas pipeline and LNG project," said Dave Cruz, AGDC Chairman. "Keith believes in Alaska and in the mission of AGDC. I'm proud to welcome him aboard," Cruz added.

AMEC Foster Wheeler, the UK-based energy engineering and construction company, has won a contract to build the first Indian LNG import and regasification terminal planned for the east coast of the country at the port of Ennore in the state of Tamil Nadu. The award followed the successful completion of a front-end

engineering and design contract for the terminal in 2012. “As part of the new contract, Amec Foster Wheeler’s responsibilities include the supervision of works related to various engineering, procurement and construction contracts for the LNG regasification and marine import facilities, as well as the LNG storage tanks. Amec Foster Wheeler will also undertake project management consultancy activities for the entire project, from engineering development and construction phases, through to pre-commissioning, commissioning and start-up of the terminal,” the UK company explained. The developer of the Ennore terminal is Indian Oil Corp., backed by the Tamil Nadu Industrial Development Corp. The Ennore LNG project will have an expandable capacity of 5 million tonnes per annum and paves the way for supplies of natural gas to reach the southern and eastern states of India where demand is growing, particularly Tamil Nadu and some parts of Karnataka and Andhra Pradesh. The facility will have two LNG storage tanks, each with capacity of 180,000 cubic metres. Amec FW said its contract will last 42 months and the completion date for the facility is around the end of 2018. While other Indian East Coast terminals are planned using Floating Storage and Regasification Units (FSRUs), Ennore is the most advanced land-based venture. All of India’s current import terminals are land-based and located on the west coast, including three near Mumbai. They are Petronet LNG’s terminal at Dahej, Royal Dutch Shell’s facility at Hazira and the Dhabol terminal, controlled by Gas Authority

of India. There is also a fourth facility owned by Petronet and located at Kochi in the southwest state of Kerala. The Ennore terminal, located north of Chennai

(formerly known as Madras) is one of four being planned on the east coast, including two in the state of Andhra Pradesh. “Following our successful completion of the

FEED contract, delivering this next phase of this project reinforces our position as a leading provider of LNG services to the Indian domestic market,” said Roberto

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Penno, Amec FW's Group President for Asia, the Middle East, Africa and Southern Europe.

AMERICAN BUREAU of Shipping has joined forces with Greece's Arista Shipping, two companies from Finland and French storage tank technology firm GTT in a joint development project for a dry bulk carrier concept that uses liquefied natural gas as fuel. The ABS partners from Finland are the design and engineering company Deltamarin and marine propulsion manufacturer Wartsila. "The goal is to develop a Kamsarmax bulk carrier design to be the first of this type suitable for worldwide services powered by LNG," ABS said. The LNG-fueled bulk carrier concept is one of the global joint ventures being showcased at the Posidonia International Shipping Exhibition taking place in Athens from June 6-10. "This landmark design will be the first LNG-fueled cargo ship capable of full-range operations," the US class society said. "The long-term potential for LNG as a marine fuel is tremendous," stated ABS Vice President of Global Gas Solutions Patrick Janssens. "We see the near-term opportunities for larger vessels on fixed and known trade routes, but more opportunities will emerge as concepts mature and bunkering infrastructure expands. Environmental stewardship will continue to be a concern, and owners will be evaluating alternative fuel choices," Janssens added. According to Arista Shipping senior executive Alexander P. Panagopulos the bulk carrier project will "bring the market a practical, achievable design for what are the workhorses of the shipping fleet." Arista operates a small owned fleet and is also active in ship management. "Our mission is to develop the next generation of energy efficient and environmental friendly dry bulk cargo ships to be sustainable worldwide beyond 2030," said Janssens. "It marks a number of 'firsts' and draws together the experience of a team of leaders in their field to make LNG powered shipping a reality on the high seas," he added. The companies Technical challenges in developing this design were considerable as there is a need to carry a large volume of LNG (2,500 cubic metres) to give a full range of operations over 40 days. ABS said it would provide Approval in Principle for the concept, which is based on the Deltamarin B.Delta 82 design and using a GTT membrane LNG fuel tank. "The concept also features a Wartsila four-stroke, medium-speed engine without

auxiliary generators, the first time this configuration has been applied to a vessel of this type, significantly simplifying its engine room arrangement and contributing to lower capital expenditure," ABS added. The Wartsila dual-fuel engine allows the use of either LNG or conventional marine fuel oils. In gas-mode the engine is IMO Tier III compliant without the need for any exhaust cleaning systems.

BEAR HEAD LNG Corp., the Canadian export plant developer in the Atlantic province of Nova Scotia, has received final federal permission to import feed-gas from the US and export processed cargoes overseas. Canada's National Energy Board had previously approved the import-export permits in August 2015 for Bear Head's proposed liquefaction plant on the Strait of Canso in Richmond County, Nova Scotia, but was subject to federal level approval. "The Government of Canada's approval of Bear Head LNG's natural gas import and LNG export licences is welcome news," said Greg Vesey, Managing Director and Chief Executive of LNG Ltd, the Australian company that owns the Bear Head project. "The strategic importance of these approvals, as well as the regulatory certainty that it provides, distinguishes Bear Head LNG in the North American LNG marketplace," Vesey said. "Bear Head is well positioned to be a major global supplier of LNG," Vesey stated. The licences authorize Bear Head LNG to import up to 14.2 billion cubic metres of feed-gas a year, which would be sufficient to export up to 12 million tonnes per annum of LNG from Canada for 25 years. Bear Head LNG already has approval from the US Department of Energy to export US-sourced natural gas to nations that have Free Trade Agreements with the US and those that don't. The Bear Head venture now has all the federal, provincial, and municipal regulatory approvals required to begin construction. LNG Ltd is also developing the Magnolia LNG export plant on the US Gulf Coast of Louisiana, though has formally postponed moving forward with the US venture pending market improvements. The parent company has admitted that like others in the energy industry, current weakness in the LNG market has affected progress in signing sufficient binding sales agreements to enable its North American projects to take final decisions on investment and construction. LNG Ltd was also forced to issue a securities exchange statement on

June 9 saying it was not aware of any takeover talks involving the company. The statement to the Australian Securities Exchange followed a surge in its shares of more than 65 percent. As well as developing the North American ventures, the company has a site lease agreement in the Australian port of Gladstone in Queensland for a possible coal-seam-gas-to-LNG venture called the Fisherman's Landing project. LNG Ltd additionally owns its own patented liquefaction processing technology system called the optimized single mixed refrigerant (OSMR) process.

BECHTEL Inc., the world's leading liquefied natural gas engineering company, a privately-held corporation whose headquarters are in San Francisco, has named Brendan Bechtel as the fifth-generation family member to be Chief Executive. Bechtel said the promotion of Brendan Bechtel would take effect on September 1, 2016, when current CEO Bill Dudley will step down from the post. Brendan Bechtel is the son of Chairman of the Board Riley Bechtel, who stepped down as CEO in 2014 after almost 25 years in the job to make way for Dudley as the first non-family member to serve as President and CEO since the company was founded 118 years ago. "I am especially honored and humbled by this election just a few weeks after we celebrated my grandfather's 75 years of continuous service to Bechtel," said Brendan Bechtel. "Representing the fifth-generation of family leadership at this remarkable company is a unique responsibility. I look forward to continuing the family's legacy started by my great-great-grandfather in 1898, and most importantly, working with our strong team of committed and capable leaders to guide Bechtel into the future," he stated. The Bechtel company is so sought after in the LNG industry that it was the main engineering contractor on Australia's three coal-seam-gas-to-LNG projects built side-by-side on Curtis Island on the Queensland coast as completely separate ventures. The company also recently completed the first US Gulf Coast LNG export plant at Sabine Pass in Louisiana. The current CEO Dudley will become vice-chairman of the Bechtel Group. At the same time as Brendan Bechtel becomes CEO he will hand his current positions as President and Chief Operating Officer of the group to Jack Futchter, a 36-year veteran of the company and president of its Oil, Gas & Chemicals business. "I am delighted to announce

these changes that further strengthen our company and puts in place a dedicated and experienced executive leadership team that will drive us forward as we continue to innovate, re-tool and consistently deliver for our customers and colleagues," said Bechtel Chairman Riley Bechtel. "This is a natural evolution in our company and the result of diligent succession planning and execution," he added. Dudley, who has served as CEO for two years and was President and COO from 2008-2014, as well as a member of the board of directors since 2000, was the first non-family member named CEO since the company's founding. Dudley joined the company in 1981. "Throughout his Bechtel career, he has excelled in operational and executive roles," the company said. "As President and COO and then CEO, Dudley is best known for having developed a strong and cohesive team among Bechtel's top leadership who delivered unprecedented results for its customers, colleagues, and the company," it added.

DELFIN LNG's export venture planned for 50 miles offshore Cameron Parish, Louisiana, has signed a \$1.5 billion financing contract with the state-owned Korean Development Bank to help guarantee the construction of three project vessels at South Korean shipyards. The Delfin FLNG financing contract was signed by KDB Chairman Lee Dong-Geol and Delfin founder Frederick Jones. Delfin would be the first US deepwater FLNG project and expects to export about 9.2 million tonnes per annum of LNG with possibilities of expanding to 13 MTPA. The project developers propose to build an onshore compressor station and use existing pipelines in the Gulf of Mexico to transport natural gas to four moored FLNG vessels. Delfin FLNG is a wholly-owned subsidiary of Fairwood Peninsula Energy and is proposing to develop a deepwater port, a floating liquefaction facility and an associated pipeline, including some onshore facilities and a mile-long onshore section of the pipeline. The company signed a joint development agreement with Hoegh LNG of Norway in February 2015 for the supply of its three FLNG vessels to be built in Korean shipyards. "The \$1.5 billion loan from KDB would cover more than 70 percent of the estimated total costs of \$2.1 billion," said the bank, in reference to the shipbuilding requirements. The KDB finances overseas projects by providing industrial capital if that adds to South

Korean economic development and guarantees jobs. "Supporting a new order like the Delfin FLNG is a meaningful project as this provides work for South Korean shipbuilders, which

have been experiencing an order shortage, especially where offshore plants are concerned," the KDB said. Front-end engineering design for the FLNG project was awarded to San Francisco-headquartered US construction and engineering company Bechtel Inc. in August 2015. The company has applied to the United States Maritime Administration (MARAD) and the US Coast Guard for authorization to construct and operate the deepwater port. The Federal Energy Regulatory Commission is also involved because of the permit required for the onshore pipeline section. Delfin proposes to activate the formerly abandoned U-T offshore system pipeline and construct new connecting pipelines, a compressor station and associated facilities. Delfin told the FERC that the majority of the onshore facilities would be within the Cameron Meadows Gas Plant and adjacent Transcontinental Gas Pipe Line (Transco) Station 44 in Cameron Parish. The LNG export plant developers, in addition to signing a joint development agreement with Norwegian company Hoegh, also have an agreement with energy and pipeline company Enbridge Inc., based in Calgary, Canada, in relation to the pipeline for the project. While MARAD and the FERC are involved, the Coast Guard is the lead federal agency preparing the Environmental Impact Statement (EIS) for the overall Delfin LNG Deepwater Port. It has also been noted by Delfin that because the US Gulf of Mexico is prone to

hurricanes almost every year, the developers will be able to disconnect the LNG hull from the port facility and move to protected waters during any serious

hurricane threat. When a draft EIS is complete and ready for public review, the Maritime Administration will publish a Notice of Availability in the Federal

Register to provide for a public comment period that will include public meetings in Louisiana and Texas. Despite delays and cancellations that have affected

There is new energy in the heart of the Mediterranean

OLT Offshore LNG Toscana S.p.A, which shares are divided among two important operators in the energy sector, Uniper Global Commodities (formerly E.ON Global Commodities) and Iren, is the company which manages the floating storage and regasification unit "FSRU Toscana". The Terminal is technologically innovative and well-advanced. It guarantees the maximum standards in terms of environmental sustainability and safety. "FSRU Toscana" is permanently moored off the Italian coast - between Livorno and Pisa - in the heart of the Mediterranean Sea. The Terminal has a regasification capacity of 3.75 billion cubic meters per year and an LNG storage capacity of 137,500 cubic meters. The operational flexibility and the design of the Terminal allow future LNG bunkering activities.

oltoffshore.it



FLNG projects elsewhere, Delfin said it was convinced that floating liquefaction will be the future of LNG production. “Floating liquefaction is environmentally friendly, cost-competitive, economical with limited scale, moveable in the event of a hurricane and has a shorter and more efficient schedule relative to an onshore plant,” Delfin said. “Furthermore, in the event that global energy markets drastically change in the coming decades, a floating liquefaction plant provides greater flexibility for decommissioning and re-deployment,” it added.

DNV GL, the European maritime and project classification society, said it was awarded a framework agreement for the provision of design and engineering technical services to Europe’s largest import terminal, Grain LNG, located near London. DNV GL, the Norwegian-German class society that emerged from the takeover by Norway’s Det Norske Veritas of Hamburg-based Germanisher Lloyd, said the scope of the three-year framework agreement covers feasibility studies, conceptual design studies, specialist engineering and risk management services up to and including front-end engineering and design. Grain LNG is located 45 miles southeast of London on the Medway River and is owned by National Grid plc. It is the largest terminal in Europe and eighth largest in the world by tank capacity and occupies a site spanning more than 600 acres. Grain LNG imports cargoes from nations such as Qatar, Algeria and Trinidad and has 1 million cubic metres capacity of storage. It also offers truck-loading facilities for the UK’s growth fuel and retail market. “National Grid are working hard to develop Grain LNG as a world leader,” DNV GL said. “Over time, as indigenous supplies from the UK Continental Shelf diminish, LNG could make up a significant percentage of the UK’s gas supply and demand requirement,” it added. According to Nicola Duffin, Commercial Manager of National Grid, “Grain recently celebrated 10 exceptional years of progress and now we are looking to the future, increasing the services we offer to our customers and working to ensure that Grain remains the European port of choice for LNG shippers. DNV GL are crucial to our safety and success.” Hari Vamadevan, DNV GL Regional Manager UK & West Africa, said the Grain LNG award was a significant contract. “The importance of LNG in the fuel mix is crucial to the UK, and the EU is supporting it as a clean fuel for road

transportation,” Vamadevan said. “It is estimated that by 2020, 70 percent of the UK’s gas will need to be imported and more importantly stored. National Grid are leading the way in their plans for Grain LNG and DNV GL is delighted to be involved in delivering success, on behalf of National Grid, to secure a better future for the provision of gas to homes and businesses throughout the UK,” Vamadevan stated.

ELBA Island’s liquefaction and export project near Savannah in Georgia has been fully authorized by the Federal Energy Regulatory Commission as one of only two major exporting ventures planned for the East Coast. The FERC permit also authorized the Elba Express pipeline to add north-to-south transportation capacity to its existing pipeline to deliver feed-gas to the export plant. Owned by subsidiaries of Kinder Morgan, the largest US pipeline operator, the Elba Island export venture is scheduled to be on stream by the end of 2018. “With the proposed mitigation measures and the recommended environmental conditions that are now included in this order, the Front-End Engineering and Design includes acceptable layers of protection or safeguards to reduce the risk of a potentially hazardous scenario from developing into an event that could affect the off-site public,” the FERC statement said. “Based on the analysis in the Environmental Assessment, we conclude that if constructed and operated in accordance with the application and supplements, and in compliance with the environmental conditions, our approval of this proposal would not constitute a major federal action significantly affecting the quality of the human environment,” the regulator stated. The FERC approval of Elba Island is the second permit given to an East Coast venture. The Cove Point LNG project in Maryland, also an existing import terminal being transformed into an export plant, is already in the construction phase. Several LNG export and fuel projects are proposed for the state of Florida, though these are small-scale fuel market ventures. The Elba liquefaction project, in which Royal Dutch Shell was previously a partner, will include the installation of 10 liquefaction units for an output capacity of around 2.5 million tonnes per annum of LNG and modifications to the terminal. Under the current schedule, the Georgia liquefaction plant could be producing LNG by the

start of 2018. Kinder agreed in July, 2015, to buy Shell’s 49 percent stake in the Elba Island terminal, leaving the pipeline company with 100 percent of the facility. The transaction cost Kinder \$630 million, bringing its total investment in all the liquefaction and terminal facilities at Elba Island to about \$2.1 billion. While Shell sold its stake in the terminal, the Anglo-Dutch company will remain as a customer. In April 2016, Kinder awarded the engineering, procurement, construction, commissioning and start-up contract to the US subsidiary of Japan’s IHI Engineering & Construction, based in Houston, Texas. Omaha-based engineering consultants HDR were recently appointed as the owner’s engineer to represent Kinder during the construction and engineering activities and to oversee due diligence in the venture. The existing terminal on Elba Island is about eight miles upstream from the mouth of the Savannah River. It was first authorized by the FERC in 1972 as an import facility. Changes to the Elba Island facility include the installation of the small modular liquefaction units, a flare system, as well as other infrastructure and modifications to the terminal piping system. To facilitate the supply of natural gas to the Elba LNG terminal for liquefaction, the company is proposing to add compression along its existing Elba Express Pipeline in Georgia. These new facilities would include the addition of various compressor stations and some interconnecting pipelines. Kinder’s operating company, Southern LNG, proposes to construct and operate new and modified compression and metering facilities in Hart, Jefferson, and Effingham Counties in Georgia and in Jasper County, South Carolina. However, to avoid any regulatory delays, the Kinder project abandoned existing LNG truck-loading facilities at the LNG terminal.

ENAGAS, the Spanish transmission network and liquefied natural gas terminal operator, has reached an agreement with Endesa Chile to purchase a controlling stake in the Chilean Quintero LNG terminal company as it furthers its commitment to invest in South American energy infrastructure. Enagas already controls 40 percent of the Chilean terminal company GNL Quintero through a separate joint venture and has bought a further 20 percent from Endesa for \$200 million. “This acquisition is subject to possible pre-emptive acquisition rights

held by other shareholders,” the Spanish company said. Enagas is one of the most experienced LNG operators in Europe and overseas. The company has Spanish import and regasification facilities at Barcelona, Cartagena, Huelva, Bilbao and El Musel. Enagas said that once its Chilean transaction was complete it would own 40 percent of GNL Quintero in its joint venture with Oman Oil Company and a further 20 percent on its own through Enagas Chile. The remaining 40 percent of the shares in the terminal is held by Chile’s ENAP and Metrogas with each owning 20 percent. The regasification facility is located in the Bay of Quintero and has been in operation since 2009. Enagas has held a stake since 2012. The facility is one of two import terminals currently operating in Chile while two others are planned as natural gas increases in the country and throughout the region. Quintero has three LNG storage tanks with overall storage capacity of 334,000 cubic metres. It can also handle the largest LNG carriers up to 265,000 cubic metres capacity. The terminal is also planning to expand with the construction of a third LNG storage tank with 160,000 cubic metres of capacity and to increase its send-out capacity to 833,000 cubic metres (n)/h. Enagas said the additional investment in the GNL Quintero import company demonstrated its commitment to Chile and Latin America. “For Enagas, the future development and growth of the GNL Quintero terminal is a priority, as it is a fundamental infrastructure for the security of energy supply in Chile. This deal enables Enagas to consolidate its position and reinforces its long-term commitment to the country,” it added. The Spanish company is also present in Mexico and Peru. In Mexico, Enagas holds a stake in the Altamira regasification and import terminal in the Gulf of Mexico. It has also set up as part of the contractor consortium, two strategic infrastructure projects, the Morelos gas pipeline and the compression station at Soto La Marina. In Peru, Enagas holds a 26 percent stake in Transportadora de Gas del Peru (TGP), the national transmission network, and 30 percent of Compañía Operadora de Gas del Amazonas (Coga), the company which operates and maintains TGP’s transmission system. It is additionally part of a contractor consortium for the construction of the largest energy infrastructure in Latin America, the Gasoducto Sur Peruano pipeline project in southern Peru, measuring 1,134 kilometres in length. Work began in May

2015 and Enagas has a joint venture concession to build, operate and maintain the pipeline for 34 years.

ENAGAS, the Spanish transmission network and liquefied natural gas terminal operator, is advancing in the development of new services, including bunkering plans for shipping to promote the wider use of LNG and recently signed an agreement with the Port of Barcelona. Enagas Chief Executive Marcelino Oreja and the President of the Port of Barcelona in northeast Spain, Sixte Cambra, said the LNG initiative was centred on the import terminal, operated by Enagas, as well as the port area. The port authorities and Enagas are hoping to convert the Port of Barcelona into one of the LNG distribution hubs emerging in the Mediterranean area for marine fuel and trucking. Enagas is one of the most experienced LNG operators in Europe and overseas. The company owns joint venture stakes in two overseas LNG terminals at Altamira on the Gulf Coast of Mexico and at Quintero in Chile, as well as having the Spanish facilities at Barcelona, Cartagena, Huelva, Bilbao and El Musel. “Both the Port of Barcelona and Enagas are firmly committed to natural gas, which is currently internationally recognized and promoted as a fuel for the transportation of goods because it represents a truly sustainable alternative to conventional fuels derived from crude oil,” the two companies said. They noted that LNG was being increasingly used in shipping for tankers and land transportation of trucks and that by the end of 2016 around 100 ships will be powered by LNG. The

Enagas storage and regasification plant in the Port of Barcelona has been in operation since 1969 and the operator has much accumulated experience and know-

how regarding the handling of LNG. “The availability of this plant constitutes a great opportunity to develop the process of changing the type of fuel used in the Port,”

they added. Enagas CEO Oreja, highlighted the more than 45 years of experience that the company has in the natural gas sector and the important role



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that the regasification plant in Barcelona can play as a logistics centre, especially given the growing demand. “The use of natural gas can help improve the competitiveness of transport activity, as it is a cheaper fuel than petroleum,” Oreja said. Cambra said that the main benefit that changing to this fuel will bring to Barcelona will be a reduction of pollution and would improve air quality for the environment and the city. “Compared to petroleum-based fuels, LNG emits 80 percent fewer nitrogen oxide emissions and no particulates and sulphur oxide emissions,” the port president added. Enagas and the port authorities stated that the presence of an LNG supply infrastructure available for Barcelona will help in its promotion as an alternative transportation fuel. “The agreement will afford greater speed to the supply chain that is needed to convert the Port of Barcelona into an LNG distribution hub in the Mediterranean. Thus, the introduction of this alternative fuel will improve the air quality of the environment, increase the competitiveness of logistics and transportation (as its price is lower than that of diesel) and also help to attract new shipping lines with modern LNG-fueled ships,” they said. The collaboration between Barcelona and Enagas is also part of the European Union-backed “Hive” project, headed by Enagas in collaboration with over 40 organizations and companies, including Barcelona. “These actions include the adaptation of a berth from which LNG can be supplied to barges and small-size ships and the modification of a barge to supply LNG to ships,” Enagas added. The plans for Barcelona also include clean electricity generation in the port area. This would come from the installation of an LNG-fueled natural gas generator to supply power to cargo ships after they berth at the port. Additionally, plans include the conversion of heavy-duty port vehicles to LNG and the design of a new tug for the port using the cleaner fuel.

ENI, the Italian energy company, is contemplating the impact of its new “significant” natural gas discovery in the Baltim South West exploration prospect in the waters of the Nile Delta offshore Egypt. This latest discovery comes as Eni moves forward with initial engineering to open up the largest natural gas discovery in the East Mediterranean, called Zohr 1X and located in the Shorouk block in 4,750 feet of water offshore the city of Alexandria. The world-class Zohr find was announced in August 2015 by the energy

company and the Egyptian government. The new Baltim South West 1X well is 12 kilometres from the coast in 25 metres of water depth and 10 kilometres north of the Nooros field, discovered in July 2015. Egypt had previously been an LNG producer from two liquefaction plants on its Mediterranean coast but the facilities were shut because of a shortage of feed-gas. Existing Egyptian natural gas supplies have been diverted by the state energy companies since 2013 to satisfy high demand in the domestic market and the nation has even been importing LNG to meet requirements. “The Baltim South West discovery, further confirms the significant potential of the so called ‘Great Nooros Area’, which is now estimated to hold 70-80 billion cubic metres of gas in place,” Eni stated. The Italian company said the Nooros field already reached in May 2016 a production rate of 65,000 barrels of oil equivalent per day and is targeting 120,000 boe/d by year-end 2016. “The Baltim South West 1X well penetrated approximately 120 metres of gross gas column and 62 metres of net pay sandstones of Messinian age with excellent reservoir properties,” the Italians said. “Eni is already assessing the options for the fast track development of this new find, which like that of Nooros, will exploit solutions able to accelerate the production start-up, through the maximum synergy with the existing infrastructures already present in the area,” Eni explained. The latest find comes as Aker Solutions of Norway was awarded a supply order for key equipment for the development of the massive Zohr discovery from which Eni plans to create a gas hub in the East Med. Aker said the Egyptian contract would see the delivery of its longest-ever umbilicals system for the Zohr gas field project. The Aker contract involves the delivery of 180 kilometres of steel tube umbilicals that will connect the Zohr subsea development to an offshore control platform. Aker said the agreement with Petrobel in Egypt was worth more than 1 billion Norwegian crowns (\$122 million). Eni was given the go-ahead in February 2016 by the Egyptian Ministry of Petroleum and Mineral Resources to develop the Zohr field. The Aker work will be led by its subsea division in Oslo and manufacturing will start immediately at the umbilicals plant in Moss, Norway. “The company has invested substantially in the Moss facility over the past years. The plant has more than 20 years of experience in making the most advanced and complex umbilical systems, which are used to transport data,

power and liquids between oil and gas installations on the seafloor and facilities onshore or on platforms,” Aker said. The Norwegian company estimated that the umbilicals system for Egypt would be delivered by mid-April 2017. Eni recently performed production tests on its Zohr discovery, saying the field has “a great production capacity” and would form the basis of the gas hub. Eni said the Zohr development plan envisages the start of production by the end of 2017, just two years after the discovery, with a progressive ramp up of output.

FLEX LNG, the Norwegian-listed company whose main assets are the two LNG carriers with a capacity of 174,000 cubic metres it is having built at Samsung Heavy Industries in South Korea, has named Jonathan Cook as its new Chief Executive to draw up a future shipping strategy. Flex said Cook is currently Chief Marketing Officer for Cardiff LNG (UK) Ltd. and will commence his new duties during the fourth quarter of 2016. Flex was initially founded as a carrier company and then it changed its strategy to try and enter the liquefaction hull market, a move which failed. Cook’s career spans more than 30 years in the maritime and energy sectors with the last 16 years in the LNG industry. After graduating from Texas A&M University at Galveston he held several key positions at US companies El Paso and Excelerate Energy. He also served 11 years at sea as a licensed deck officer where he achieved the rank of Master Mariner. With the delivery of four LNG carriers in 2014, Cardiff LNG of the UK has become one of the most active niche LNG carrier operators in the spot market. “In his new role, Cook will lead the corporate and business development activities of Flex LNG,” the company told the Oslo bourse. “This includes bringing the company and its newbuildings under construction into full operations, as well as actively pursuing growth opportunities throughout the LNG value chain,” the company said. Cook said Flex LNG had a history of innovation and was extremely well positioned with its M-type, electronically-controlled, gas-injection (MEGI)-powered LNG carriers set for delivery in 2018. “The delivery of these vessels coincides with new LNG production coming to the market and increasing the demand for state of the art fuel efficient vessels,” Cook said. “I look forward to working with the management team and shareholders of Flex LNG to leverage its market position and develop

the company’s full potential in the rapidly evolving LNG industry,” he added.

FORTISBC, the power and natural gas distribution company in the Canadian province of British Columbia, said its Tilbury LNG plant expansion project was leading to \$400 million of investments to benefit businesses and provide jobs. Tilbury plant at Delta, part of metropolitan Vancouver, has already signed an agreement with Hawaiian Electric Co. to supply 800,000 tonnes per annum from the expanded peak-shaving LNG production plant. The supplies will start in 2021, depending on government and regulatory approvals in both BC and Hawaii. The \$400-million Tilbury LNG expansion includes construction of a new LNG storage tank, additional liquefaction and LNG truck loading equipment. FortisBC expects the expanded facility will be operational by late 2016 or early 2017. FortisBC has operated Tilbury LNG since 1971 and the Mount Hayes LNG peak-shaving plant on Vancouver Island was commissioned in 2011. “At FortisBC, we’re committed to providing job and business opportunities for local and Aboriginal workers and companies on our major projects,” said Michael Mulcahy, President and Chief Executive of FortisBC. “The expansion of the Tilbury LNG facility will result in increased LNG supply for our industrial users and remote communities, while bringing economic development and new jobs to BC,” Mulcahy said. The company pointed out that it has a contract with the Tsawwassen First Nation (TFN) Construction/Matcon Civil Joint Venture (TMJV) for civil construction and environmental services. The joint venture has also provided 25 employment and training programs in conjunction with the LNG expansion. “We are very proud of our work on FortisBC’s Tilbury LNG expansion project and our long-standing business partnership with Tsawwassen First Nation Construction,” said Ron Amos, President of Matcon Civil Constructors Inc. “The project provided us with an important opportunity to showcase not only our expertise in civil construction, but also our unparalleled commitments to employee development, engagement with First Nation communities and individuals, and external relationship management,” Amos explained. BC Minister of Natural Gas Development Rich Coleman praised the Tilbury venture. “FortisBC’s investments are helping our energy sector grow and compete both domestically and globally,”

said Coleman. "The benefits of the Tilbury LNG expansion are significant, supporting local contract work today and opening the doorway to a stronger economic future tomorrow," the minister added.

GAZPROM, the Russian natural gas producer, said it planned to boost liquefied natural gas supplies to the Asia-Pacific region as part of its large-scale project plans for Siberia and areas such as Sakhalin Island where the nation's only LNG export plant is located. Gazprom's Sakhalin Island oil output is called the Sakhalin I project, while the existing LNG plant is known as Sakhalin II. A press conference at Gazprom headquarters in Moscow was attended by senior executives, including the Deputy Chairmen of the Gazprom management committee, Vitaly Markelov and Alexander Medvedev, and they focused on the priority eastern projects, including pipeline supplies to China and more LNG for Japan and other nations. Gazprom stated that it was still on course to add more than 5 million tonnes of capacity to the Sakhalin Island LNG plant with a third Train to take

output to over 15 MTPA. "Design documentation is being developed for the construction of the third production Train of the LNG plant within the Sakhalin II project," Gazprom said. Gazprom also explained its new strategy in the region called Sakhalin III and including new natural gas supply and infrastructure for Russia's Eastern Siberia and Sakhalin Island region, "taking into account integrated production, transportation and supply system including potential gas exports to China and other Asia-Pacific countries." The company said it was committed to expanding its resource base with exploration at the Chayandinskoye field and full development of the Yuzhno-Kirinskoye fields as part of Sakhalin III. The mainstay production for Sakhalin III is the Kirinskoye field, located 28 kilometres offshore the north-east coast of the Sakhalin Island in the Sea of Okhotsk. Gazprom said the reserves of the field amount to 162.5 billion cubic metres of natural gas and 19.1 million tons of gas condensate. "The first gas was extracted from Kirinskoye in October 2013; commercial production started in 2014. At

present, the construction of production wells continues," Gazprom explained. "For the first time in Russia, gas is extracted by a subsea production facility," it said. "The facility can produce hydrocarbons in the harshest climates, including even ice conditions, with no platforms or other offshore structures required to be built," it added. Specifically, the Kirinskoye field offshore Sakhalin Island, developed since 2014, will see the number of producing wells increase from two to four this year. "In 2019, there will be 7 active wells at the field, with the annual gas production potentially reaching 5.5 billion cubic metres. The pre-development of the Chayandinskoye field is underway with eight drilling rigs currently employed," it added. "The expansion of gas production capacities in Russia's East takes place in tandem with the development of the gas transmission system. The construction of the 'Power of Siberia' gas trunkline is on track. The Chayanda via Lensk to Olyokminsk section is being built at present. As early as 2018, Gazprom will ensure the operational readiness of 'Power of Siberia' priority capacities running from

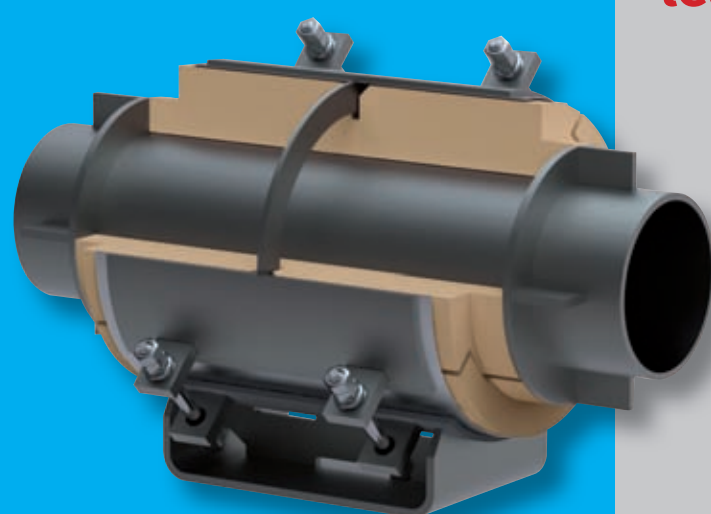
Chayandinskoye to the Chinese border near Blagoveshchensk," it added.

GAZTRANSPORT and Technigaz (GTT), the French owner of liquefied natural gas maritime and other storage technologies, has received a tank supply order for two new LNG carriers to be built at the South Korean shipyard in Ulsan of Hyundai Heavy Industries. The vessels were ordered by Korea's SK Shipping and are scheduled for delivery in 2019.

GTT said the ships will be equipped with GTT's newest Mark III Flex membrane storage tank technology. Despite the global overhang in the LNG supply market because of lower prices, there will be growing demand for ships in the next couple of years to deliver the higher production volumes. "SK Shipping has been using vessels equipped with GTT membranes for some time, and we are very committed to this excellent partnership," said Philippe Berterottiere, Chairman and Chief Executive of GTT. GTT said its Mark III Flex is particularly well-suited for the highly efficient propulsion system installed on SK Shipping's LNG carriers



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as the technology offers a high level of insulation performance. “GTT is very pleased to continue our collaboration with HHI. This new contract demonstrates HHI’s confidence in GTT technologies which already equip some 50 LNG carriers in service built by the shipyard,” explained CEO Berterottiere. The French company said the Mark III technology was already in service on 34 LNG carriers currently operating. “GTT continues to develop its Mark range, particularly through improvements in design and the use of components that are more and more efficient,” it explained. “This development allows GTT to offer insulation solutions that provide ever-increasing performance adapted to the requirements of the latest vessel propulsion systems, which are more fuel efficient, as well as new projects that require greater resistance to liquid motion, particularly for multi-gas applications, or partially filled tanks,” GTT added.

MAN DIESEL and Turbo, the German marine propulsion systems maker, has secured another order from South Korean shipbuilder Daewoo Shipbuilding and Marine Engineering (DSME) under its latest contract with Greek shipping operator Maran Gas for the construction of two LNG carriers with dual-fuel options, including gas power. Maran already has four of MAN’s M-type, electronically-controlled, gas-injection (MEGI)-powered LNG vessels on order at DSME. MAN has its headquarters in Augsburg, southern Germany, and is part of the Volkswagen Group. Maran Gas is the LNG shipping company of Angelicoussis Shipping, Greece’s largest shipowner. The MEGI dual-fuel engine represents many years of development work for MAN. “Depending on relative price and availability, as well as environmental considerations, the ME-GI engine gives shipowners and operators the option of using either heavy fuel oil or predominantly natural gas,” MAN explained. MAN said that in the latest order Maran vessels will have the systems installed in two LNG carriers and two Very Large Crude Carriers (VLCCs) and both ship-types have a number of options at the Korean DSME yard. The LNG carriers are scheduled for delivery in 2019 and the VLCCs are due to be completed in the first half of 2018. The newbuilds are described as the next generation of ecologically-friendly vessels meeting International Maritime Organization Tier III standards. The two 173,400 cubic metres capacity LNG carriers to be built with a length of 295 metres and a breadth of 46 metres will

each be fitted with MAN B&W 2 x 5G70ME-C9.5-GI gas and fuel engines. “This engine type is expected to raise fuel efficiency significantly compared to a standard LNG carrier, while at the same time lowering emissions,” MAN said. In December 2015, MAN said it had agreed to acquire marine fuel-gas supply system company Sweden-based Cryo AB, part of Germany’s Linde Group, to broaden its LNG equipment offerings. Cryo, based in Gothenburg, is a manufacturer of cryogenic systems for the storage, distribution and handling of liquefied gases. MAN said at the time that the fuel-gas supply specialist would further enhance MAN’s scope in offering marine LNG propulsion.

JAPAN’S Ishikari liquefied natural gas import terminal, located on the northern main island of Hokkaido, has begun construction of a fourth storage tank as part of the nation’s main LNG expansion plans. Ishikari, which takes its name from the Ishikari River on which it stands, is one of Japan’s newest regasification facilities and began commercial operations in 2012. It is the only large-scale LNG import base in Hokkaido, whose capital is Sapporo, and imports cargoes from Sakhalin Island in the Russian Far East and from Australia. Of the four tanks planned for the terminal only one is operational and three others are still to be completed. Two of the storage tanks belong to Hokkaido Gas Co., including the one in operation of 180,000 cubic metres capacity, while two others will be owned when completed by Hokkaido Electric Power Co. The Ishikari terminal has been operating as an import and regasification facility for more than three years and also has a berth for coastal LNG vessels and a truck-loading facility. A second tank with storage capacity of 180,000 cubic metres is being built as is tank three with capacity of 230,000 cubic metres. The fourth tank will also be the largest version with 230,000 cubic metres of storage. The tank on which work has just started is scheduled for completion in October 2020. Ishikari LNG terminal is being built to support future demand from the Ishikari Bay New Port gas-fired power plant currently under construction. The power plant comprises three 569-megawatt gas-fired power units. The start of commercial operations for the Ishikari Bay generating plant is scheduled for February 2019 and will boost gas-fired power capacity in the continued absence of most nuclear power. Japan currently has only two nuclear plants in full service out

of 50 while a third N-plant that was previously in operation has shut for maintenance. The country imported 85.04 million tonnes of LNG last year compared with the record 88.51MT in 2014, a fall of 3.9 percent. The total cost of LNG shipments for the whole of 2015 in dollar terms amounted to \$46.6Bln compared with \$66.1Bln in 2014 as prices have fallen in line with oil. The year before the Fukushima nuclear and tsunami disaster of March 11, 2011, Japan imported 70.00MT of LNG. In 2011 when the disaster occurred, the annual LNG imports were 78.53MT, followed by 87.31MT in 2012, 87.49MT in 2013 and the record 88.51MT in 2014.

JAPAN’S Port of Yokohama plans to set up the nation’s first liquefied natural gas bunkering operation under a proposal to promote more clean fuel use in the shipping industry. The Japanese government is backing the plan along with Tokyo Gas, the third-largest LNG importer and owner of regasification facilities in Tokyo Bay. Tokyo Gas said that another initial participant in the LNG bunkering project is Nippon Yusen Kabushiki Kaisha (NYK Line), one of the largest shipping companies in the world. A meeting is scheduled for June 9 in Tokyo involving Tokyo Gas, NYK Line, the Port of Yokohama and the Japanese Ministry of the Economy, Trade and Industry and the Ministry of Transport. Plans are also under way to establish LNG bunkering working parties for other Japanese ports. Tokyo Gas already operates an LNG import terminal in Yokohama and NYK Line has several tugboats operating with LNG as fuel. “The committee will examine the state of the city’s port, as well as the costs, technological needs and market factors involved in the project and will produce an infrastructure development plan,” a statement said. Measures to promote LNG as a maritime fuel and for vehicles such as trucks were included in Japan’s plan announced in May 2016 to develop the LNG market. As LNG use in shipping spreads in Europe and North America, Japan is now moving forward to keep its shipping industry and ports at the forefront of the regulatory moves towards cleaner fuel and the creation of Emission Control Areas (ECAs). The tougher environmental legislation to create the ECAs has already prompted a shift towards alternative fuels for ships over the past few years and a rise in the number of ships ordered to take LNG as a

fuel, sometimes on a dual-fuel basis. This development will continue in 2020, with the introduction of the 0.5 percent sulphur regulations in European waters and the worldwide sulphur cap expected to enter into force by 2025 at the latest.

JAPANESE liquefied natural gas imports declined 4 percent in the second successive monthly drop as the world’s largest LNG importer opted for coal instead, with shipments of that commodity surging 44 percent. The May deliveries of LNG to Japan amounted to 5.52 million tonnes compared with 5.75MT in May 2015, according to the preliminary trade statistics from the Ministry of Finance. While LNG imported by Japan for gas-fired power generation and city-gas distribution dropped, the shipments into the country of thermal coal for generating electricity jumped 44 percent to 8.60MT in May compared with 5.98MT in the same month of 2015, even as coal prices were 10.7 percent higher year-on-year. Japanese LNG imports had actually risen by a marginal amount in March 2016 for the first time since August 2015, to 8.14MT compared with 8.13MT in March last year, a rise of 0.1 percent. However, the downward trend resumed in April 2016 when the shipments dropped 3.3 percent year-on-year to 6.38MT. The latest LNG import figures also illustrated the falling price of LNG with deliveries in May 2016 costing 183 billion yen (\$1.75Bln), down 42.0 percent compared 315Bln yen (\$3.01Bln) in the year-ago period. Fewer cargoes were imported from the Middle East while Asian imports rose. Total shipments of LNG from the Middle East were down 14 percent. Deliveries from countries like Qatar, the United Arab Emirates and Oman fell to 1.24MT in May. These were partially offset by Asian deliveries from nations such as Malaysia and Indonesia, Papua New Guinea and Brunei which amounted to 1.86MT, a rise of 3.2 compared with the 2015 month. Russian imports also rose 24 percent compared with the year before to 595,000 tonnes. The balance of other imports in the preliminary figures amounted to 1.82MT from exporting nations such as Australia and Nigeria as well as the spot market. There were still no imports logged yet in Japan from the United States. On June 9, Japan said the price of spot LNG cargoes imported into the country in May amounted to \$4.30 per million British thermal units, down from \$5.10 per MMBtu in the previous month and from

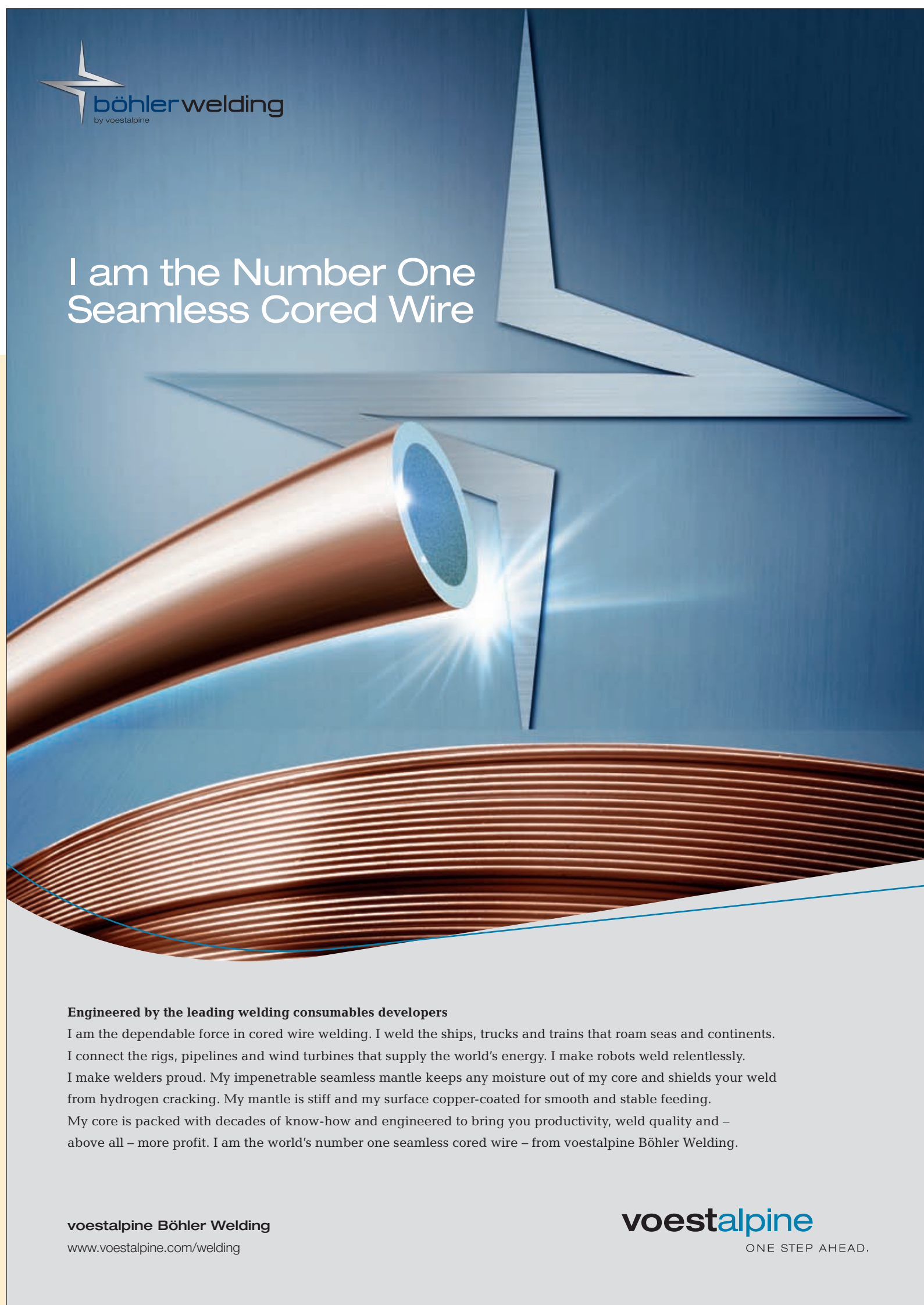
\$7.90 per MMBtu in the year-ago period. The spot cargo numbers come from the commerce division of the Japanese Ministry of Economy, Trade and Industry and are only issued if a minimum number of two trades are recorded. The ministry emphasizes that “spot LNG” refers to fuel traded on a cargo-to-cargo basis and does not mean shipments under contracts on a short-term, medium-term or long-term basis. Prices prior to averaging are all converted into an equivalent Delivered Ex-Ship (DES) basis whereby the seller carries the cost of the shipping.

KINDER MORGAN, the largest US pipeline company and developer of the Elba Island liquefaction plant in the state of Georgia, has selected a unit of the American Bureau of Shipping classification society to develop a maintenance and integrity program for the facility. ABS said its consulting subsidiary would provide a program for the liquefaction plant and the upgrade terminal. “We are pleased to provide mechanical and asset integrity services to Kinder Morgan for the Elba LNG Project,” said Charles Mitchell, ABS Group Vice President for Business Development in the energy sector. “ABS is committed to supporting LNG infrastructure projects globally by helping operators manage asset safety, reliability and efficiency in order to maintain the integrity of their facilities and business operations across their respective enterprise,” Mitchell added. “The Elba project will leverage ABS Group’s core capabilities providing enterprise asset management (EAM). ABS Group has performed more than 330 projects worldwide supporting LNG

facilities and maritime assets delivering EAM,” the class society added. The US class society said ABS Group had contributed to “best practices in process

safety and mechanical integrity” with its technical advisors “uniquely positioned” to continue supporting clients in the evolving North American LNG market.

Kinder announced on June 13 that the Elba Island liquefaction and export venture had been fully authorized by the Federal Energy Regulatory Commission.



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The FERC permit also authorized the Elba Express pipeline to add north-to-south transportation capacity to its existing pipeline to deliver feed-gas to the export plant. Owned by subsidiaries of Kinder Morgan, the Elba Island plant is scheduled to be on stream by the end of 2018. The FERC approval of Elba Island is the second permit given to an East Coast venture. The Cove Point LNG project in Maryland, also an existing import terminal being transformed into an export plant, is already in the construction phase. Several LNG export and fuel projects are proposed for the state of Florida, though these are small-scale fuel market ventures. The Elba liquefaction project, in which Royal Dutch Shell was previously a partner, will include the installation of 10 liquefaction units for an output capacity of around 2.5 million tonnes per annum of LNG and modifications to the terminal. Kinder agreed in July, 2015, to buy Shell's 49 percent stake in the Elba Island terminal, leaving the pipeline company with 100 percent of the facility. The transaction cost Kinder \$630 million, bringing its total investment in all the liquefaction and terminal facilities at Elba Island to about \$2.1 billion. While Shell sold its stake in the terminal, the Anglo-Dutch company will remain as a customer.

KINDER MORGAN, the largest US pipeline and terminal company, has named Omaha, Nebraska-based company HDR as owner's engineer for its Elba Island liquefaction and export project at the existing import terminal near Savannah, Georgia. The Elba liquefaction project, in which Royal Dutch Shell was previously a partner, will include the installation of 10 small-scale liquefaction units for an output capacity of around 2.5 million tonnes per annum of LNG and modifications to the terminal. Under the current schedule, the Georgia liquefaction plant could be producing LNG by the

start of 2018. Kinder agreed in July, 2015, to buy Shell's 49 percent stake in the Elba Island terminal, leaving the pipeline company with 100 percent of the facility. The transaction cost Kinder \$630 million, bringing its total investment in all the liquefaction and terminal facilities at Elba Island to about \$2.1 billion. While Shell sold its stake in the terminal, the Anglo-Dutch company will remain as a customer. In April 2016, Kinder awarded the engineering, procurement, construction, commissioning and start-up contract to the US subsidiary of Japan's IHI Engineering & Construction, based in Houston, Texas. HDR as owner's engineer will represent Kinder during the construction and engineering activities and oversee due diligence in the venture. The Omaha firm will also make sure the Japanese contractors are adhering to the project specifications. The existing terminal on Elba Island is about eight miles upstream from the mouth of the Savannah River. It was first authorized by the US Federal Energy Regulatory Commission in 1972 as an import facility. Changes to the Elba Island facility include the installation of the small modular liquefaction units, a flare system, as well as other infrastructure and modifications to the terminal piping system. To facilitate the supply of natural gas to the Elba LNG terminal for liquefaction, the company is proposing to add compression along its existing Elba Express Pipeline in Georgia. These new facilities would include the addition of various compressor stations and some interconnecting pipelines. Kinder's operating company, Southern LNG, proposes to construct and operate new and modified compression and metering facilities in Hart, Jefferson, and Effingham Counties, Georgia, and in Jasper County, South Carolina. However, to avoid any regulatory delays, the Kinder project abandoned existing LNG truck-loading facilities at the LNG terminal.

LLOYD'S REGISTER, the UK maritime classification society, said it was proceeding with the second phase of a liquefied natural gas bunkering initiative for the Eastern Mediterranean and Adriatic Sea. "Its ultimate objective is to prepare in detail a global solution of infrastructure development in the Mediterranean area so that LNG can be embraced as the marine fuel of the future," said LR of the project called PoseidonMed and backed by the European Union as well as member states Italy, Greece and Cyprus. The UK class society said the second phase of PoseidonMed was under way and was examining the promotion of LNG as a fuel and looking at several ports to create bases for bunkering operations in the East Med. "The PoseidonMed II technical team is thoroughly assessing the key findings, incorporating them into the detailed studies for vessels and initially involved ports, like Piraeus and Limassol," it said. "A risk assessment methodology, solutions scenarios and tools and hazard identification have already started to be examined and assessed for implementation for the ports of Igoumenitsa, Patras and Heraklion to ensure they meet the high safety standards for LNG bunkering procedures and operations," LR explained. The Greek Revithoussa LNG import terminal is a key strategic asset for Greece and is well positioned to LNG marine fuel capacities as it undergoes an upgrade. The Revithoussa facility, which has been operational since 2000, has mostly received imports from Algeria in small carriers of 75,000 cubic metres capacity. "Using Revithoussa terminal offers one of the main practical solutions towards the adoption of LNG as an alternative fuel for the shipping industry, while also contributing to the development of small-scale LNG applications," LR said. Panos Mitrou, LR's PoseidonMed Project Manager, said the EU-backed venture partners have committed to a "very ambitious second phase" and raised the stakes with detailed preparation for more than 10 vessel conversions to LNG and the construction of an LNG small-scale carrier to serve bunkering and other needs. "With the technical deliverables of the first phase already submitted to the European Commission, work now gets into the detail in both ports and operations," Mitrou explained. "Igoumenitsa port has been the most recent subject of study with a HAZID workshop and concept analysis

performed on site, while Patras and Heraklion are to follow. LR will also complete a gap analysis on candidate shipyards for LNG work before the end of this summer," he added.

LNG LTD of Australia, developer of two North American liquefaction plants in the US state of Louisiana and the province of Nova Scotia in Canada, has issued a securities exchange statement saying it was not aware of any takeover talks involving the company. The statement to the ASX followed a surge in its shares of more than 65 percent in recent trading sessions. LNG Ltd. is developing the medium-scale Magnolia LNG export plant near Lake Charles in Louisiana and the Bear Head project in Nova Scotia. It also has a site lease agreement in the Australian port of Gladstone in Queensland for a possible coal-seam-gas-to-LNG venture called the Fisherman's Landing project. LNG Ltd. additionally owns its own patented liquefaction processing technology system called the optimized single mixed refrigerant (OSMR) process. "In response to an article in today's 'Financial Review', Liquefied Natural Gas Ltd. is not aware of or is in discussions in relation to a takeover," said the short statement. LNG Ltd. has seen its shares fall over the past 12 months because of the LNG market slump and oversupply. The company's market capitalization has subsequently gone from a high of \$2 billion a year ago to A\$300 million last week and A\$543M on June 9 after the share surge. The LNG Ltd. shares were last trading on the ASX at A\$1.09 from A\$4.30 in June 2015. The company in April 2016 named Gregory M. Vesey from US major Chevron Corp. to replace founder Maurice Brand as Managing Director and Chief Executive based in Houston, Texas. However, Brand will continue as an Executive Director of LNG Ltd. until his retirement scheduled for June 2017. The Australian company said Vesey was bringing "a wealth of experience to this role, most notably through his 35 years with Chevron" in a number of senior executive roles. Vesey was president of Chevron Natural Gas and Vice President of Gas Supply and Trading from 2011 to 2015 where he was responsible for Chevron's global LNG, natural gas, and natural gas liquids marketing and trading activity. Vesey said at the time he was excited to join LNGL and lead the next phase of its project and corporate development. "While the LNG industry is under

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- LNG 2nd International Summit**
April 24-25, 2017
Cannes, France
http://lngsummit.org

Flame Natural Gas & LNG Conference
May 2017 (dates to be confirmed)
Hotel Okura, Amsterdam, the Netherlands
https://energy.knect365.com/flame-conference

pressure in the short term, the LNGL business model of mid-scale projects using its wholly owned OSMR technology combined with its portfolio of projects in Magnolia LNG, Bear Head LNG and Fisherman's Landing LNG enable the company to be successful globally," Vesey had said.

MEO AUSTRALIA, the independent oil and gas exploration and production company with interests in Cuba and an LNG project on hold in the Timor Sea, said it received encouraging results from a licence in the Bonaparte Basin offshore Western Australia and was looking for a farm-in partner. MEO owns 100 percent of the Beehive prospect licence, WA-488-P, located in the Petrel sub-basin between the producing Blacktip gas field and the undeveloped Turtle and Barnett oil discoveries. "Seismic reprocessing and inversion studies over the Beehive prospect in WA-488-P have now been completed, with very encouraging results," MEO said in its statement to the Australian Securities Exchange. "The Beehive prospect is one of the largest hydrocarbon structures in Australia," said MEO Chief Executive Peter Stickland. "Results from data across the Beehive prospect have exceeded our expectations. This study has generated multiple data sets, with a dramatic improvement in data quality," Stickland added. "All of the products are pointing in the same positive direction and strengthen our understanding of the likelihood of good reservoir and seal characteristics, which are key elements of the Beehive interpretation. MEO will now proceed to update its risk analysis and characterisation of the Beehive prospect and then

seek a farm-in partner to fund further exploration of the prospect," the CEO of the Melbourne-based company explained. MEO's previous LNG ambitions were for

the shallow water area offshore Australia's Northern Territory called the Tassie Shoal. Original MEO plans for TSLNG envisaged a liquefaction plant

being towed or carried to the site by a heavy-lift vessel and ballasted directly in place, thus avoiding Floating LNG complexities. MEO had developed the

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Max flow rate (lpm)	100	100	430	430	640	640	640	1450	1450	4200	4200
Max differential head (m)	270	540	280	560	220	445	890	100	200	100	200

Model	VT-3 S	VT-3 D	VT-3 T
Flow rate max @ 450 rpm (lpm)	80	160	240
Max allowable working pressure (bar)	350	350	350

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concepts for constructing an LNG facility as well as a methanol plant at Tassie Shoal and still has long-dated Federal and State Government environmental approvals until 2052. MEO is also involved in exploration in Cuba. It recently said its technical review of the Cuba Block 9 production sharing contract with Cuba Petroleo Union that there was confirmation of “significant prospectivity” in the block. The Australian company believes its position in Cuba provides a strong early mover advantage ahead of ongoing strengthening of diplomatic relations between Cuba and the US. The company’s WA-488-P permit was awarded in 2013 for an initial six-year term. MEO said Beehive in the Bonaparte Basin was potentially a multi-billion barrel, oil prone prospect located in 40 metres of water next to the producing Blacktip field. “The carboniferous age objective is a 180 square kilometres isolated carbonate build up with 400m of mapped vertical relief, analogous to the giant Tengiz field in the Caspian Basin. This play type is new and undrilled in the Bonaparte Basin,” MEO said.

NIPPON YUSEN Kabushiki Kaisha (NYK Line), the Japanese shipping and offshore project company, has taken a stake in the subsea joint venture launched by Japanese liquefied natural gas and energy company Chiyoda Corp. amid consolidation in the sector. Chiyoda, based in Yokohama, said NYK Line would take a 25 percent interest in Emas Chiyoda Subsea. The Japanese engineering company said taking NYK Line on “will provide valuable access to NYK’s experience in the offshore oil and gas industry”. Chiyoda is one of the world’s leading LNG engineering companies, working on projects in Australia, Mozambique, Russia and the US and it is responding to consolidation in the industry that saw France’s Technip initiate the takeover of Houston, Texas-based FMC Technologies. Chiyoda’s backlog of LNG and natural gas work at the start of 2016 amounted to \$8.5 billion. Emas Chiyoda Subsea is a global engineering, procurement and construction service provider and was only created in March 2016 as a 50-50 joint venture between Singapore-based Ezra Holdings, the offshore contractor, and Chiyoda. As part of this earlier Emas Chiyoda transaction, Chiyoda paid Ezra a cash consideration and injected additional capital into the joint venture company. The venture, marrying Ezra’s

and Chiyoda’s complementary areas of expertise, was created to allow the undertaking of larger and more complex offshore subsea construction projects. After completion of the NYK Line transaction, Ezra, Chiyoda and NYK will respectively hold 40 percent, 35 percent and 25 percent of Emas Chiyoda Subsea. “Under our medium-term management plan, Chiyoda has been focusing on expanding its business into the offshore and upstream fields,” said Shogo Shibuya, President and Chief Executive of Chiyoda, which itself is almost 40 percent owned by Mitsubishi Corp. “After the establishment of Emas Chiyoda Subsea in March 2016, today, I am excited that Ezra, Chiyoda and NYK reached the agreement for NYK to join Emas Chiyoda,” Shibuya added. “I am confident that the participation of NYK will accelerate the growth of ECS’s capability as a leading offshore EPCI contractor,” he said. Lionel Lee, Group CEO and Managing Director of Ezra, said of the transaction: “We are extremely delighted at the latest development that has resulted from continued strategic interest in the Emas Chiyoda Subsea business and would like to extend a warm welcome to NYK as an integral partner. This investment by yet another established name in the offshore and marine space is a strong authentication of the strength, global standing and long-term prospects of our subsea business.”

NOBLE ENERGY, the US company with natural gas assets and LNG plans offshore Israel, said the Israeli government has approved the development plan for the Leviathan project, the largest energy venture in the Eastern Mediterranean. “The approved plan of development, contemplates a subsea system that connects production wells to a fixed platform located offshore with tie-in onshore in the northern part of Israel,” Noble said. The Leviathan field is operated by Noble and its partners include subsidiaries of Israel’s Delek Group. It has estimated recoverable natural gas resources of around 22 trillion cubic feet. The fixed offshore platform’s initial capacity is anticipated to start at 1.2 billion cubic feet of natural gas per day and will be expandable to 2.1 Bcf/d. “Leviathan is expected to provide a second source of supply and entry point into Israel’s domestic natural gas transport system, while also delivering exports to regional countries,” said Noble, referring to Egypt and Jordan. Noble and

its main partner Delek earlier announced the execution of a sales and purchase agreement to supply natural gas from the Leviathan field to Israeli company IPM Beer Tuvia Ltd. “Noble and the Leviathan partners will supply a gross quantity of up to 473 billion cubic feet of natural gas to a new-build independent power facility over an 18-year term, or up to 72 million cubic feet per day (MMcf/d),” Noble added. The price for the natural gas supplied to Israel is linked to the Public Utility Authority Index and includes a firm floor price. However, Noble expects total gross revenues under the Israeli contract to be in excess of \$2.5 billion. “Receiving support from the Government of Israel for the plan of development further builds upon recent regulatory momentum, including the Natural Gas Regulatory Framework as well as the approval of the offshore location for the Leviathan platform and pipeline connection onshore,” said J. Keith Elliott, Senior Vice President for Noble in the Eastern Mediterranean. “Noble and partners have made quick progress marketing natural gas to new customers. Combined with a prior executed sales agreement, we have now contracted volumes from Leviathan to the Israel market in the amount of approximately 100 MMcf/d, with substantial volumes yet to contract in Israel and the region. Strong momentum on the regulatory and marketing fronts represents major steps in advancing the Leviathan project towards a final investment decision,” Elliott stated. Noble Energy operates Leviathan with an almost 40 percent stake. The other shareholders are Delek’s drilling and Avner Oil Exploration subsidiaries as well as Ratio Oil Exploration, which holds 15 percent.

PETROBRAS, the Brazilian state-run energy company, has launched an international bidding process for the sale of its two liquefied natural gas import terminals, which have already received LNG cargoes from the new export plant at Sabine Pass in Louisiana. The two import facilities are chartered Floating Storage and Regasification Units at Guanabara Bay in Rio de Janeiro state and at Pecem in the northeast state of Ceara. Brazil has a third LNG FSRU located at the port of Salvador in the central Atlantic coast Bahia state since 2013 and which is not part of the sale process. Both FSRUs import projects being sold include associated charters and onshore infrastructure connecting them

to the natural gas network. Petrobras is also selling gas-fired power plants linked to the floating LNG terminals. The Brazilian FSRUs rose to prominence in 2016 when they received two of the initial commissioning cargoes from Cheniere Energy’s Sabine Pass export plant. Brazil is the world’s largest generator of electricity from hydropower. However, it set up the Rio and Pecem import facilities in 2009 and entered the LNG market to provide back-up from gas power during the summer months when the Amazon River and other hydro sources are at lower levels. The sale of the LNG terminal is part of an asset restructuring first announced in June 2015 as Petrobras adapts to falling oil and gas prices and revenues from its huge offshore resources as well as a home-grown economic crisis. The state oil company is aiming to sell \$14.4 billion in assets in 2016, while maintaining investment in other offshore infrastructure. Petrobras recently completed the sale of assets in Argentina and in Chile for \$1.4Bln as part of its restructuring programme. Petrobras in 2007 had contemplated setting up onshore LNG terminals to use its own natural gas resources sent ashore by pipeline, but the ventures, including one backed by BG Group of the UK, never passed the planning stage. The FSRU “Golar Spirit” is the vessel located at Pecem. The State Government in Ceara has previously studied setting up an onshore regasification terminal. Using closed-loop regasification technology and over-jetty LNG transfer, the “Golar Spirit” has storage capacity of 129,000 cubic metres and is contracted to Petrobras until 2018. The “Golar Winter”, a carrier conversion constructed in 2004, has a regasification capacity of 14 mmcm/d and was initially located at Guanabara Bay near Rio. However in 2011 Petrobras signed a 15-year time charter agreement with Excelerate Energy of the US to provide an advanced FSRU, the “Experience” with 173,400 cubic metres of capacity for the delivery of 20 mmcm/d of gas to the south-eastern region of Brazil. As part of that deal it was agreed that the “Golar Winter” at Guanabara Bay would be replaced by the modern Excelerate vessel now in place and the “Golar Winter” was moved to the northeast port of Salvador.

SEMPRA ENERGY of California and TransCanada Corp. have been awarded a US\$2.1-billion contract to build, own and operate the pipeline from South Texas

into Mexico where the US company has liquefied natural gas interests and ambitions. Semptra's Mexican subsidiary, Infraestructura Energetica Nova (IEnova) and TransCanada have concluded their agreement with Mexico's Federal Electricity Commission (CFE) for the 497-mile (800 kilometres) pipeline. The pipeline will run from South Texas to Tuxpan in the Mexico coastal state of Veracruz and will have a capacity of 2.6 billion cubic feet per day. The project is scheduled to be completed and in service by late 2018. It will transport natural gas from a point near Brownsville, Texas, to Tuxpan in the state bordering the Gulf of Mexico. Principally, the Texas-Tuxpan pipeline will provide natural gas to new and existing combined-cycle gas-fired power plants that currently use fuel oil. "The project is contracted by CFE under a 25-year capacity contract denominated in US dollars," Semptra said. The Semptra-TransCanada joint venture will be responsible for implementing the project, including permitting, acquiring land and rights of way, engineering, procurement, construction, financing, operation and maintenance. TransCanada will own 60 percent of the project with IEnova having 40 percent. "We are pleased with the results of the tender and look forward to continue to grow our presence in Mexico while helping the country meet its energy demand with new safe and reliable services," said Mark Snell, President of Semptra Energy. IEnova already develops, builds and operates energy infrastructure in Mexico and is studying an LNG production plant proposal for its Costa Azul import

terminal on the Pacific Coast. IEnova and Semptra LNG in February 2015 signed a memorandum of understanding with Petroleos Mexicanos (Pemex), for

cooperation and coordination in developing an LNG project at Costa Azul or elsewhere. Costa Azul, located 100 miles south of Semptra's corporate

headquarters in San Diego, has large parcels of land available for liquefaction. The Costa Azul import facility came on line in 2008 and LNG cargoes



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were imported from Asian nations such as Indonesia before the North American shale-gas boom. When Sempra completed the Costa Azul terminal it became the first LNG regasification facility on the west coast of North America. The terminal is capable of processing up to 1 billion cubic feet of natural gas per day. Sempra's IEnova unit is the first energy infrastructure company to be listed on the Mexican Stock Exchange. Sempra is also the owner of the US Cameron LNG terminal in Louisiana that is currently being transformed into an export plant and was recently given a permit for an increase in capacity. Cameron LNG is a joint venture owned by Sempra, but with additional Japanese and French investors. The US regulators in May 2016 gave Sempra permission to build two additional liquefaction Trains and five in total for almost 25 million tonnes per annum in LNG production on the shore of the Calcasieu Ship Channel at Hackberry. Sempra is developing the Cameron plant with Japanese partners Mitsui & Co. and Mitsubishi Corp. and French utility and LNG player Engie, the former GDF-Suez.

SHELL Chief Executive Ben van Beurden and Russian Gazprom Chairman Alexei Miller signed an agreement at the St. Petersburg International Economic Forum to further their cooperation in the liquefied natural gas market and the Nord Stream pipeline project. Gazprom said Van Beurden and Miller discussed “progress of and prospects for strategic cooperation” in the LNG sector, paying particular attention to the construction of the third production Train of the LNG plant on Sakhalin Island liquefaction plant in the Russian far east in which both are shareholders. “An emphasis was placed on the issues related to the ongoing Nord Stream 2 pipeline project,” Gazprom added. In addition, Miller and Van Beurden signed an accord on the Baltic LNG project as a follow-up to the agreed “strategic cooperation” on that long-standing venture. “The companies will explore the possibilities and prospects for building an LNG plant with an annual capacity of 10 million tons in the port of Ust-Luga, Leningrad Region,” the Russian company said. “We continue to expand our successful cooperation with Shell. An LNG plant oriented toward Asia-Pacific is efficiently operating on Sakhalin Island in eastern Russia. We are working to enhance its capacity. We will now explore the possibilities for joining our efforts in

the promising Baltic LNG project in western Russia. The new project will greatly diversify Gazprom's sales markets and strengthen our LNG portfolio,” said Gazprom’s Miller. Van Beurden said Shell and Gazprom were convinced that LNG and natural gas in general have great prospects. “Over the past year, we made great efforts to advance our strategic cooperation,” the Shell CEO said. “Shell's primary focus in Russia is the expansion of the Sakhalin II project and the establishment of a world-class LNG centre in Russia's Far East,” he added. “At the same time, we continue to consider new avenues for collaboration in the energy sector,” the Shell CEO stated. Gazprom holds 50 percent plus one share in the Sakhalin plant while Shell has 27.5 percent and Japanese trading house Mitsui & Co has 12.5 percent, while Mitsubishi Corp owns 10 percent.

SHELL's Asian trading subsidiary has signed an agreement to purchase the first LNG cargoes from Japan’s newest bi-directional terminal that imports and regasifies shipments and also offers re-loads. Japanese importer Shizuoka Gas Co. said it signed a sale and purchase agreement with Shell Eastern Trading for cargoes re-loaded at its Sodeshi import terminal, located at the port of Shimizu, just south of Tokyo. “This is our first binding contract to supply LNG through our LNG terminal,” the Japanese company said. “Shizuoka Gas is continuously committed to pursuing the possibilities for the reduction of LNG cost by increasing transaction volumes at Shimizu LNG Terminal and taking advantage of liquidity in the expanding global LNG market,” it added. Shizuoka said it was looking for other ways to maximize its facilities and achieve the reduction of LNG costs in the newly deregulated natural gas and energy markets. “As one of our initiatives, we converted Shimizu LNG terminal into a bi-directional terminal by adding reloading facilities in April of this year,” it explained. Shizuoka Gas has operated the Sodeshi import terminal in Japan since 1996. The facility has three storage tanks with capacity of 337,200 cubic metres. Shizuoka has imported most of its LNG over 20 years from Malaysia. The first Japanese re-load is expected to be lifted by the Shell trading unit by the end of the year or early 2017 on a free-on-board basis whereby Shell supplies the shipping. The re-loading concept is not new in Japan as large import terminals

have often re-loaded cargoes onto small-scale carriers to be shipped to satellite regasification facilities elsewhere along the coast. Shizuoka is one of the Japanese utilities, along with Tokyo Electric Power Co., that has signed a preliminary accord with Shell to receive cargoes from the planned Prelude floating LNG project offshore northwest Australia. The city-gas company is also part of a landmark mutual supply agreement signed in June 2012 with importer Tokyo Gas Co. and overseas liquefaction plant developer Inpex Corp. for the three Japanese companies to share resources in the event of an emergency or natural disaster. The agreement was part of a disaster preparedness programme started among Japanese utilities and energy companies after the March 2011 earthquake and tsunami that led to the Fukushima nuclear disaster.

SHELL said the takeover of LNG portfolio company BG Group is reshaping the Anglo-Dutch oil and gas major and providing \$1 billion in additional savings, while the company’s investments in new liquefaction projects would be slowing down. Shell Chief Executive Ben van Beurden made these points and others in a speech to investors at a capital markets day where he provided an update on the company’s strategy. “The integration of BG is gathering pace, and today we expect to deliver more synergies, and at a faster rate,” Van Beurden said. In reference to the BG takeover, the Shell CEO said the company would slow its LNG investments and take advantage of the revenue flows. “Integrated gas, which was previously a growth priority for Shell, has reached critical mass following the BG acquisition and planned growth in LNG, particularly in Australia. The pace of new investment will slow here and integrated gas will now prioritize the generation of free cash flow and returns,” he stated. He also announced an increase in expected deal-related synergies from the BG takeover from the \$3.5 billion set out in the prospectus, to \$4.5Bln on a pre-tax basis in 2018, an increase of some 30 percent. After the takeover of BG the quarterly LNG sales of Shell rose to 12.29 million tonnes, putting the company on track for around 48MT of LNG sales for the whole of 2016 that will demonstrate its more dominant position in the market. Shell’s latest LNG sales volumes were 3MT more than the first-quarter 2015 volumes of 9.81MT. Its quarterly liquefaction

volumes at various plants amounted to 7.04MT. Van Beurden said the company’s downstream and integrated gas businesses had still delivered strong results to underpin the financial performance despite continued low oil and gas prices. “We expect to achieve and exceed the \$3.5 billion (BG) synergies prospectus commitment earlier than expected, in 2017, when synergies should be \$4 billion. Our other deal-related financial commitments to shareholders in the form of asset sales, debt reduction, and dividends, followed by share buy-backs, are unchanged,” Van Beurden stated. He went on to set out Shell’s portfolio priorities, which have been revised to drive an improvement in returns and free cash flow. Setting his remarks in the context of a volatile industry backdrop, Van Beurden said there were more opportunities for Shell from “the substantial and lasting changes underway” in the energy sector. “We expect to see robust demand for oil and gas for decades to come, in a global energy system in a long-term transition to lower carbon fuels. As well as low oil prices today, we are seeing higher levels of price volatility, due to geopolitical change, the speed of information flows, and the pace of innovation in our sector. By capping our capital spending in the period to 2020, investing in compelling projects, driving down costs and selling non-core positions, we can reshape Shell into a more focused and more resilient company,” Van Beurden added.

SOVCOMFLOT, the Russian shipping line building up a fleet of LNG carriers, has signed a \$260 million loan agreement with Russia’s VTB Bank to purchase an additional carrier to deliver cargoes for the Yamal liquefaction and export plant being built in the Arctic region. The financing for the LNG vessel with Arctic capabilities is over a period of 13 years and was signed in the Russian city of St Petersburg by Sergei Frank, President and Chief Executive Sovcomflot, and Andrei Kostin, President and Chairman of VTB Bank. SCF said the newbuild will be able to carry up to 172,600 cubic metres of LNG and has an Arc7 enhanced ice class, enabling independent navigation in ice fields of up to 2.1 metres thick. The LNG project is currently under construction in the Yamal Peninsula, led by Russian natural gas company Novatek, and when completed the first phase will comprise three liquefaction Trains each producing 5.5 million tonnes

per annum for total output of 16.5 MTPA. Other investors in the Yamal LNG plant include France's Total and China National Petroleum Corp. The Russian shipping company currently has eight LNG carriers in its fleet with one other vessel under construction that has been the subject of the financing. SCF said the vessel will have a 45 megawatts propulsion system, which is comparable to that of the nuclear-powered ice-breakers. The vessel is due to be delivered in the first quarter of 2017. "We are delighted to expand our cooperation with VTB, our long-standing partner and one of the Russian banking market leaders," said SCF CEO Frank. "We are completing the construction of an innovative vessel, which has no analogues in the world to date, and we have concluded a unique transaction to finance this project," Frank explained. "This is one of the first such agreements ever signed in Russia, to finance a vessel construction, which is traditionally a very capital-intensive and long-term investment project. I am confident that the solid performance delivered by our company will enable it to continue to be a reliable and attractive partner for Russian banks," the CEO added. VTB Bank President Kostin said the LNG carrier loan was for an "innovative and high-tech" project. "The loan to Sovcomflot, Russia's largest shipping company, will be used to build a unique new ice-resistant LNG tanker for the Russian Arctic. I'm confident it will help Russia further develop this harsh territory," Kostin added.

TECHNIP, the French energy and LNG engineering company, which is currently in the middle of a takeover of

FMC Technologies of the US, has signed an LNG accord with the oil and gas division of US conglomerate General Electric to cooperate on exploring digital

solutions for LNG projects. Technip and GE Oil & Gas said the memorandum of understanding would centre on bringing all the advantages of the digital age to

the engineering, construction, commissioning and operational phases of LNG ventures. The first phase of the cooperation will be to determine which



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solutions could be applied to LNG projects as well as the operation and maintenance of existing LNG infrastructure. “All solutions under consideration would encompass Technip and GE Oil & Gas expertise in digital tools and be powered by Predix, the world’s first and only cloud-based operating system built exclusively for the industry by GE,” a statement said. “GE has a strong track record in providing equipment reliability solutions for a number of LNG facilities around the world, through sensors, advanced analytics and diagnostic expertise. Technip brings its unique expertise in the engineering, procurement and construction (EPC) phases of LNG and LNG new frontier projects,” the statement added. “Combining our complementary areas of expertise allows us to explore new digital capabilities for LNG that can be applied from the design and build phases all the way through to the operational phases,” said Rod Christie, President and Chief Executive of the Turbomachinery Solutions unit of GE Oil & Gas. “By embedding digital thinking at the very beginning of project development, we are truly building the digital future of oil and gas,” Christie added. Nello Uccelletti, President of the onshore-offshore division of Technip said the French company was entering this partnership with the “same pioneering spirit” which inspired it 50 years ago when Technip built the world’s first LNG plant in Algeria. “Together with GE Oil & Gas, we aim to develop digital solutions that create value over the entire life of a project. As we did 50 years ago, as we are doing it in the Floating LNG era, we are also convinced this partnership will represent another significant step forward in the LNG industry,” Uccelletti added. Technip is a leader in FLNG project engineering. It is responsible for the topsides of the “PFLNG Satu” which will be the first LNG production vessel to enter service in 2016 offshore Malaysia. It is also involved as a joint venture engineering partner with South Korea’s Samsung Heavy Industries in the Australian Prelude FLNG venture of Royal Dutch Shell. In addition, Technip is working on the subsea section of the onshore Wheatstone LNG project in Western Australia being developed by Chevron Corp. and Woodside. Another of its projects is the Yamal LNG venture in Arctic Russia being developed by Novatek of Russia, France’s Total and China National Petroleum Corp. On May 19,

Technip and US operator FMC Technologies said they had agreed to merge to create a combination valued at \$13 billion and a leader in the global subsea sector. Combining Technip and Houston-based FMC brings together the largest provider of subsea equipment to the industry and gives valuable back-up services to Floating LNG specialist Technip. The merger plan comes at a time when costs can be shared by energy industry service providers amid a slump in oil prices that has led customers to postpone or reduce investments in new projects. The French-US combination already works closely together and in March 2015 announced a joint venture for offshore fields, called Forsys Subsea, as they sought to cut costs.

TOHO GAS, the Japanese utility and importer of LNG from nations such as Australia, Qatar, Indonesia and Malaysia, has added the US to its supply list after finalizing an agreement to buy three cargoes a year from the Cameron export plant being built in Louisiana by Sempra Energy of California. Toho currently imports more than 2.5 million tonnes per annum of LNG and supplies city-gas customers in the Tokai region of central Japan. The company said it had signed a firm agreement to receive 200,000 tonnes a year from a US subsidiary of Japanese trading house Mitsubishi Corp., one of three overseas investors in the Cameron plant along with Japan’s Mitsui & Co. and French utility Engie. The US Federal Energy Regulatory Commission in May 2016 authorized Cameron LNG to build two additional liquefaction Trains and five in total for almost 25 million tonnes per annum in production. Sempra’s existing LNG import terminal is being transformed into a liquefaction plant on the shore of the Calcasieu Ship Channel at Hackberry, Louisiana. While Toho’s other long-term LNG supply contracts are linked to the oil price, the Cameron cargoes will be priced against the US benchmark Henry Hub and with Mitsubishi supplying to shipping. The US deliveries will begin in 2019 and last up to 20 years and contain a clause for destination flexibility. “We strive for LNG procurement diversification, including diversification of the price-index, supply sources and types of contracts, to ensure a stable energy supply to customers at a competitive price,” said Toho, an operator of 28,000 kilometres of Japan’s natural gas pipeline network. “From this perspective, we have positioned this

contract as a strong candidate of the new LNG supply sources and have negotiated on a sale and purchase agreement of LNG. We have entered into the sale and purchase agreement after discussion with the seller about the contract details since entering into Heads of Agreement in April 23, 2015,” Toho explained. “We will continue diversifying LNG procurement to ensure stable city gas supply to customers at a competitive price,” Toho said. The Hackberry liquefaction plant is being built by LNG engineering companies CB&I of the US and Japan’s Chiyoda Corp.

VENTURE GLOBAL LNG, a Washington DC-based company, said it had recruited one of North America’s most experienced LNG executives as it advances with the development of two export plants in Louisiana, one at Plaquemines on the banks of the Mississippi River and a second near the Calcasieu Ship Channel. VG LNG has named Terry Newendorp, the founder and former chairman of the investment bank Taylor-DeJongh, to its board of directors. “Newendorp brings more than 30 years of expertise specific to LNG,” the company said. “He has served as the financial advisor for 27 trains of LNG production, more than 77,000 megawatts of power generation and more than 26,000 kilometres of pipelines. Previous to the board appointment, Newendorp acted as an advisor to the company,” VG LNG added. The co-Chief Executives of the company, Mike Sabel and Bob Pender, said in a statement: “We are pleased to have a professional of such high caliber serving on our board. Mr. Newendorp’s deep expertise in LNG project development and finance will add value to our company as we approach the final investment decision for our two LNG projects in Louisiana.” The VG Plaquemines project will be located on 630 acres near river mile-marker 55 on the west side of the Mississippi, 30 miles south of New Orleans. The Mississippi river project will produce 20 million tonnes per annum of LNG and will include 20 small-scale liquefaction Trains, four LNG storage tanks and three marine loading berths for ocean-going vessels. VG is also planning to produce 10 MTPA of LNG at its Calcasieu Pass facility to be developed on a 1,000-acre site located at the intersection of the Calcasieu Ship Channel and the Gulf of Mexico. The VG company was founded by Sabel, a banker by profession, and Pender, a lawyer. Sabel

was an equity fund manager and venture capitalist, while Pender is a former partner at Hogan Lovells, a global law firm. The company recently raised additional capital of \$55 million, bringing the total funding to date to more than \$265M. The proceeds will fund VG LNG development activities for both of its proposed export facilities.

WORLEYPARSONS, the Australian US LNG and energy engineering company, was awarded the contract for another phase of the Cutbank Ridge project as part of the long-term development of natural gas resources in northeast British Columbia that will eventually underpin LNG production plants. The Cutbank Ridge partnership involves Canada’s Encana Corp. and Japanese trading house Mitsubishi Corp., which has been building up its North American natural gas and LNG assets. Canadian energy company Veresen Midstream is also involved. Mitsubishi paid US\$2 billion for a 40 percent partnership interest in about 409,000 net acres of Encana’s undeveloped Montney Shale play. The Montney formation is part of Encana’s Cutbank Ridge resource that spans northeast BC and the northwest of the province of Alberta. The Montney has produced natural gas since 1998 and Encana has been active in the area since 2004. “We are pleased to be able to support the Cutback Ridge Partnership and Veresen Midstream in the development of British Columbia’s gas resources,” stated Andrew Wood, Chief Executive of WorleyParsons. “We are also pleased to be able to continue to build on our relationship with Encana, Mitsubishi and Veresen Midstream through the award of this important project,” Wood added. WorleyParsons said it would provide module assembly and field construction services for the Cutbank Ridge Saturn Phase 2 Sweet Gas Plant Project at an approximate contract value of C\$130 million (\$US100M). The plant is located about 25 kilometres northwest of Dawson Creek in BC province. “The contract will be led and executed by the WorleyParsons Edmonton, Alberta, operations, which has been delivering modularization and construction services to western Canadian hydrocarbons, power and chemical sectors for several decades,” the company said. “WorleyParsons will be working with communities and local businesses located in northeast British Columbia during the field construction phase of the project,” it added. ■

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Timely expansion of global LNG fleet coincides with need for more optimal use of shipping assets

Kenneth Wilson sees much potential for improved productivity and opportunities for consolidation

The LNG shipping fleet is presently characterized by oversupply. At the end of 2015, the cargo capacity of the fleet was 7.1 percent higher than at the start of that year, greatly exceeding the 0.5 percent growth in the world's LNG imports.

The LNG fleet has much potential for improved productivity. Presently, most ships spend half the time in ballast and consolidation between producers and traders should also result in more optimal use of shipping assets.

Riskier

The plentiful availability of ships has been conducive to the advent of traders and the development of riskier markets where spare ships after modification can serve either as an FSU or FSRU.

The rapid growth in the fleet over the remainder of the decade, which will continue to feature delivery of speculative ships ordered in recent years, should ensure a plentiful supply of shipping capacity at competitive rates.

Planning of future LNG shipping requirements has become increasingly problematic. The overall length of sales contracts has been getting shorter, the option to re-negotiate clauses is a more common feature and destination restrictions are being removed.

Set against this predicament has been an ongoing, rapid expansion of the LNG carrier fleet offering players the opportunity to charter ships on a voyage or short-term basis, at very competitive freight rates, to complement their more complex trading activity.

The LNG shipping fleet is presently characterized by oversupply caused by overzealous ordering of speculative ships and lacklustre growth in demand.

Expansion

Over the next four years the fleet is set to expand by a compound average growth rate of 8 percent, not factoring in additional orders and deletions. This is higher than the 5.1 percent witnessed over 2011-2015.

While global LNG trade is also set to grow substantially in the next four years, by 7.3 percent, as new liquefaction

facilities in Australia and the US come on stream, most of the shipping capacity needed for these projects has already been contracted, leaving limited room for the speculative ships whose owners are also likely to have to contend with increased regionalization of trade and shorter voyages.

The result of the fleet oversupply has been declining freight rates.

Since soaring to levels in excess of US\$150,000 per day in mid-2012, time charter rates for modern LNG ships have fallen substantially to US\$30-35,000/day for tri-fuel diesel electric (TFDE) types and just US\$15-20,000/day for steam turbine designs.

The lower end of these ranges is applicable to spot voyages, while the higher is attainable for charter periods of up to a couple years.

At these charter rates, ship owners are hard pressed to secure adequate returns on their initial CAPEX investments. This has resulted in newbuilding activity drying up.

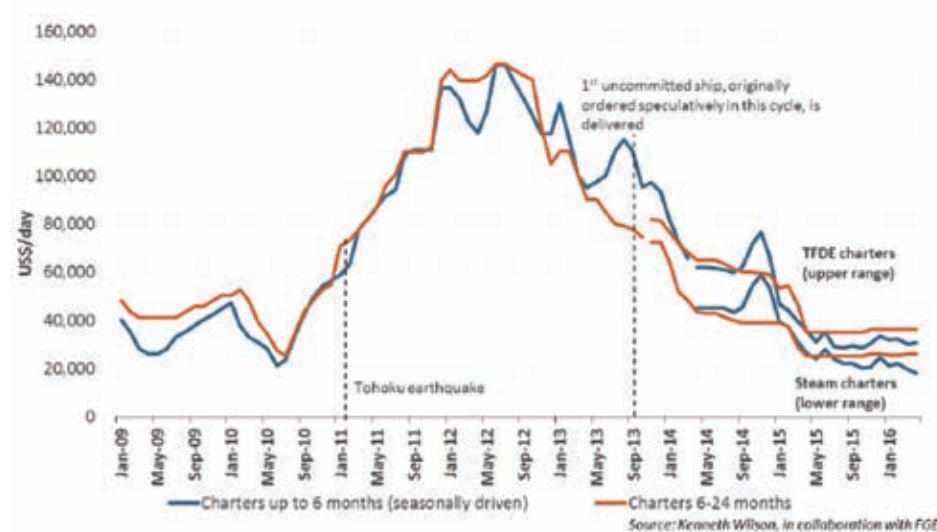
Marketing

The sharp run-up in freight rates in 2010 and through 2012 was caused firstly by an abrupt change in marketing strategy by Qatar, which had boosted its LNG production capacity by some 150 percent, to 77 MTPA.

RasGas and Qatargas were obliged to charter in conventionally sized ships as the 45 Q-Max and Q-Flex vessels of over 200,000 cubic metres, which had been built to serve US and UK terminals, were too large to immediately access alternative markets.

The upturn in freight rates was boosted further in March 2011 by the earthquake and tsunami that forced Japan to replace nuclear power with other energy sources including LNG, which at that time was only readily available from distant suppliers, including the Persian Gulf, West Africa and further afield.

The high rates of return on shipping in the aftermath of the Japan disaster encouraged another bout of speculative ordering similar to the mid-2000s, this time also underpinned by ample



Charter costs for part of global LNG carrier fleet

shipbuilding capacity that had been expanded to construct the Qatari Q-classes and the large-scale renewal of the oil tanker and bulk carrier fleets.

Declining interest rates and quantitative easing in the aftermath of the Great Financial Crisis were also factors acting in owners' favor, as indeed was the governments' willingness to extend cheap credit in support of their shipbuilding industries.

Unlike other merchant shipping sectors, the scrapping of older tonnage in LNG has never led to a recovery in the sector's fortunes.

Since 2001, 31 LNG ships have been scrapped or converted, equivalent in capacity terms to just 3.5 percent of what was delivered over the last 15 years.

The LNG fleet is relatively modern, with an average age of 11.5 years. Ships with an age of 30 years and older, which may be considered due for retirement, represent just 6.33 percent of the overall fleet.

Cyclical growth

Moreover, most of such ships are currently laid up and are thus effectively out of the market. Therefore their eventual retirement, one way or another, will have a negligible impact on freight rates.

Many have recently changed hands at prices above nominal scrap levels, as buyers foresee a myriad of opportunities to convert them to floating storage units (FSU), Floating Storage and Regasification Units (FSRU), and even

floating LNG (FLNG) production units.

Specialty ships

Despite the availability of many modern ships in recent years, LNG sellers and buyers have often preferred to contract newbuildings, thereby adding to the shipping oversupply situation.

Strong nationalist interests are usually behind this decision, with the likes of China and India wanting to add value through participation in shipping activity, rather than any being driven by specific technical reasons. The Arctic-class fleet for Yamal LNG is an obvious exception.

However, the greater unpredictability of the destiny of cargoes, particularly from the US, has made ship operators, especially the Japanese and European importers, pause for thought and defer their newbuild plans.

Rock-bottom freight rates, coupled with owners' diminished bullishness about prospects later this decade, are resulting in some compelling propositions to charterers who could use existing ships to bridge the period until trade patterns perhaps become clearer.

The sharp decline in LNG prices in northeast Asia has increased the attractiveness of Europe as a destination, where the shipping requirement is less than half of what would be needed for trans-Pacific hauls through the new Panama Canal locks.

There is also the possibility of a large proportion of US Gulf Coast natural gas exports being shut in, at least initially, due

to lack of demand, thereby resulting in further length of LNG shipping capacity.

An indication of the oversupply of shipping is in the independently-owned, post-2000 fleet of ships of 137,000-177,000 cubic metres.

At the beginning of May 2016, tracking of the independently-owned fleet of ships due off charter by 2020 indicated that there were 37 ships deployed on occasional voyages and/or available for charter.

Another 17 ships under construction - including three FSRUs - were believed not to have been fully committed to any charter.

Notwithstanding the possibility of charterers opting to extend charters, over one-third of charters of the 45 existing ships are due to expire by the end of 2018 - during which the overall fleet is set to expand considerably.

In the case of those ships presently deployed on routes where supply commitments are extended or renewed beyond charter expiry dates, then an extension, renewal or ship substitution would be necessary.

Requirements

However, most of the shipping required by new liquefaction projects starting this side of 2020 has already been contracted, reducing the opportunity for other ships that become available.

Within the fleet, the average ship capacity is 159,250 cubic metres and

one-quarter are traditional steam turbine types.

Rapid technological development in LNG shipping recently has meant that the preferred size is now around 175,000 cubic metres - about the largest for the new Panama Canal locks - whilst diesel propulsion is in vogue due to their higher efficiencies.

Nonetheless, although older ships are smaller, with higher boil-off gas rates, and are less fuel-efficient, they are still expected to be popular candidates in an environment of subdued freight rates and relatively low bunker fuel costs.

If shorter, intra-regional hauls, become more prevalent, as seems likely, then the scale and operating diseconomies of the older ships should become less of an issue.

Future

Charterers seeking ships post-2000 built ships of 137,000-177,000 cubic metres capacity for short-term purposes may also secure suitable contenders among that portion of the fleet - some two-thirds of total capacity - which is normally dedicated to specific projects, controlled by companies with interests in various facilities, or where charters and options extend beyond 2020.

As many as two-dozen in this category are known to have been idle recently and some are occasionally offered for charter or sublet to third parties, including those previously assigned to Angola LNG,

Yemen LNG, and the two Egyptian

projects that are offline, together with various Malaysian and Bruneian flagged ships.

The excess of ships naturally complements the growth in spot and short-duration trades and the desire among buyers for destination flexibility and seasonality in cargo off-take.

Short-term charters are also a useful means of supplementing producers' core shipping fleets during periods of peak demand or when spare cargoes arise.

Conclusion

Independent shipowners' preparedness to develop fleets of non-project dedicated ships has been very timely in view of the growing importance of flexible short-term LNG sales and the difficulty of predicting future trade patterns.

On the one hand, under 70 MTPA of LNG export capacity at five different plants is being developed in the US Gulf and east coasts on a trading model that is unprecedented whilst, on the other, in the traditional mainstay markets, Japan and South Korea, demand is wavering.

In addition to providing supplementary transport cover for spot trades, the ample availability of ships enables operators to defer making decisions on contracting newbuildings in the current market.

The plentiful availability of ships - and an oversupply of LNG lately - has been conducive to the advent of traders who are normally focused on short-term

arbitrage opportunities, including the use of shipping capacity for storage, and development of riskier markets where spare ships after modification can serve either as an FSU or FSRU.

Much of the foreseeable growth in LNG demand is expected to emanate from new markets in Asia, Africa and Latin America.

Most of these markets are insufficiently large to justify dedicated fleets, and would be most suitable for the use of spare ships, perhaps on a contract of affreightment basis.

Countries in these regions often have strong shipping and trading interests and could potentially form joint ventures with experienced operators that provide the ships initially.

The rapid growth in the fleet over the remainder of the decade, which will continue to feature delivery of speculative ships ordered in recent years, should ensure a plentiful supply of shipping capacity at competitive rates.

Furthermore, a latent over-supply of shipping in the form of sub-optimal utilization, and a potential to make better use of the fleet, should continue to ensure that suppliers and consumers are well served and that freight rates remain attractive. ■

The above article was authored by Kenneth Wilson, an expert in LNG shipping economics and commercial practice. He is a Distinguished Associate of FACTS Global Energy.

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GULF OF MEXICO, USA

Europe is adapting to economic changes while regional energy market has abundant supply

Raffaele Perfetto of Eni on impacts for Europe of US LNG, Russian gas and the Med Hub

The European gas price has fallen around 25 percent to as low as \$4.10 per million British thermal units in the last year, a downward trend caused by several factors.

These are mainly the low oil price scenario and its effect on the oil-indexed pipeline contracts, weak internal and Asian demand, competition from less expensive coal and an impulse towards (subsidized) renewables.

Economics

The International Monetary Fund said the European Union had a relatively low 1.6 percent economic growth rate in 2015, with the lower activity particularly affecting the power sector and as a consequence demand for natural gas.

Energy security is still on top of the EU agenda as the body - soon to be 27 instead of 28 as the UK prepares to withdraw - struggles to diversify away from its dependence on pipeline supplies, especially from Russia.

The region can boast

2014 and since then it was mostly been under-used.

Looking at gas contracts we can simplify them into four main categories, according to consultants Timera Energy, the provider of expertise on value and risk in European energy markets and global LNG.

There are inflexible (pipeline or LNG) contracts; flexible contracts with Norway; flexible LNG and Russian spot supplies; and flexible pipeline suppliers.

We must concentrate our attention on the last three types of contracts because these can create different price dynamics.

Looking at trends in demands and consumption, BP's most recent global energy outlook foresees a Compound Annual Growth Rate (CAGR) for natural gas of 1.8 percent until 2035. In the OECD nations, this growth is coming from the coal-to-gas transition in power generation.

Also ExxonMobil supports this view,

The EU has set an aggressive target for renewables and reductions in CO2 emissions and these are impacting gas consumption forecasts going forward.

pipeline capacities of around 450 billion cubic metres a year, investments in reverse flow pipelines have been delivered to further reduce dependency (Poland and Austria, for example).

Regional LNG's capacity is around 200 Bcm/year, though it is to be noted that leading up to

forecasting that gas market growth will climb to 30 percent in power generation.

Gas in Europe is consumed mainly by households and for electricity production, half of it going to combined heat and power (CHP) plants, while industry

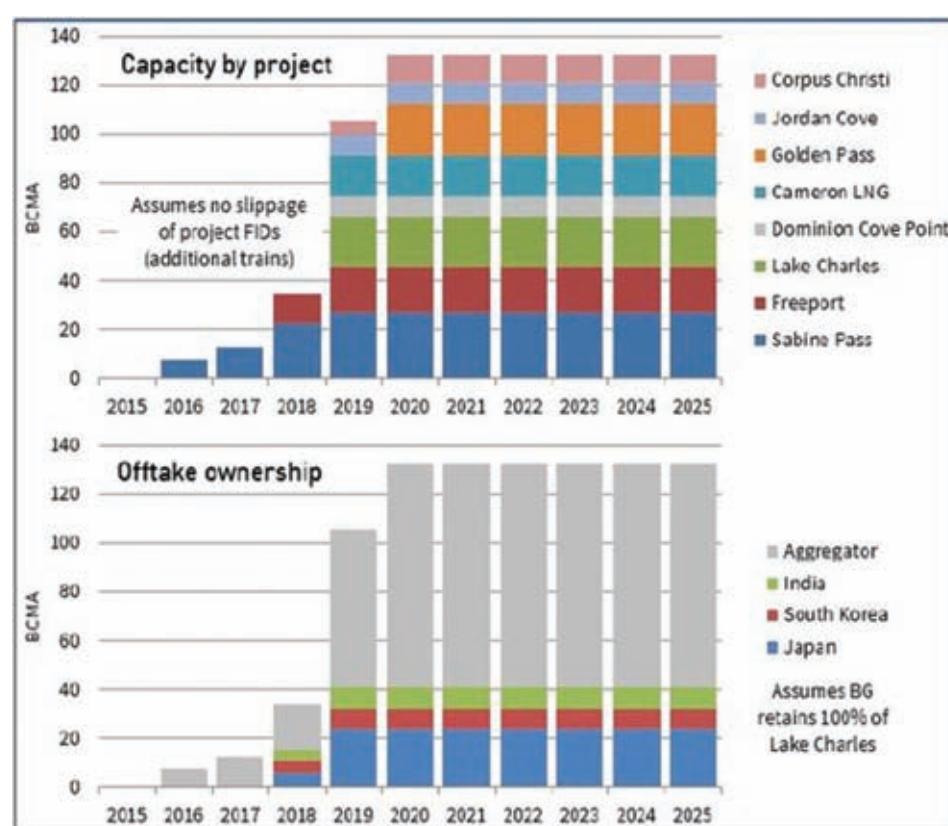


Figure 1: US LNG capacity by project (Timera Energy)

accounts for approximately 25 percent of consumption, according to the EU figures.

The EU has set an aggressive target for renewables and reductions in CO2 emissions and these are impacting gas consumption forecasts going forward. In this view, gas is the natural bridge for the transition process from coal and its high emissions.

Having said that, it is important to underline the better capabilities of gas-fired turbines for power plants. These are more suitable in being combined with renewables to address peak loads and to guarantee the proper flexibility in the system.

Timera Energy has estimated 50+ Bcm of power generation converted from coal in the actual price scenario.

American LNG

The first cargo from Cheniere's Sabine Pass terminal was delivered to Europe in April, 2016.

Around 80 Bcm per annum of US LNG capacity will eventually be built, according to some estimates.

This represents a tectonic shift for gas trading globally and for the EU in particular, even if until 2018 the volume

of LNG sent out from the US Gulf coast is expected to be small.

However the flow from the US to the EU will be driven by the price differential between the two Atlantic's sides. Timera's analysis suggest that US exports can continue until the spread between the Henry Hub and the UK's National Balancing Point benchmarks is higher than cost. In May 2016, it was estimated that the cost differential varied between \$0.60 - \$1.10 per MMBtu.

Russian moves

This means that in future, the flows of gas, can be directed toward other destinations rather than the EU.

In particular, it will depend also on the reaction of Russian gas supplier Gazprom. Russia's EU strategy could be one of defending its market share by under-cutting US prices by big margins.

The start-up of US LNG is already putting downward pressure on EU regional prices, squeezing the flexible contracts (Norway and LNG) and also the Russian spot: here buyers are interested in taking gas supplies at the minimum take-or-pay levels.

The recent gas exports from Russia to

Europe have ranged between 150-180 Bcm/a and the overall pipeline capacity is 240 Bcm/a of which 120 Bcm/a passing through Ukraine.

Russia is facing a strategic issue of if and eventually how to diversify Ukrainian routes to Europe. The 31 December 2019 the contract in force between Gazprom and Naftogaz of Ukraine will end.

The volume of exports from Gazprom has been affected by price trends in the EU area. Data shows that sales in the 2007-2008 period were between 171-174 Bcm/a, then after the economic and global banking crisis they dropped between in 2008-2013 to 15-162 Bcm/a.

Indeed during this last window, the price differential between oil-linked contracts and European Hubs went down.

Gazprom has reduced the prices of oil-linked contracts and sales have picked up again to 2008 level. The EU market is moving towards a greater proportion of spot contracts, lowering the number of contracts lasting 10 years or more.

If Gazprom has really decided to stop any gas flows across Ukraine, we can

estimate this flow to be around 54 Bcm/a. Will the LNG replace it? From the US, Qatar or the Mediterranean Hub? Regarding the gas availability from the Med Hub, it is quite difficult to estimate actual available quantities at present.

Future

The real question is what if Russia actually follows through with its threat to completely shut down flows across Ukraine?

The first US LNG cargoes are starting to arrive in the EU, and two main options can be available for Gazprom: lose market share, or cut selling prices and protect its share.

The second option above passes through a relaxation over the Ukrainian case, and the predominance of a sense of pragmatism.

If Gazprom persists in its position (closing the Ukrainian transit) it has to consider another point: the EU's decision to lift or not, the capacity constrain upon the OPAL pipeline, one of two connecting the Nord Stream pipeline to the existing

links. Because if the EU will not remove this constrain, the market share lost for Gazprom is not so low... let's see below.

If the EU allows more than 50 percent of OPAL's usage for Gazprom, (that must guarantee between 0.70-0.85 of take or pay volumes) Gazprom can lose "only" between 6.6-33.6 bcm/a, according to some estimates.

If the EU will not allow usage of more than 50 percent of capacity, the loss can range between 23.6-50.6 bcm/a.

Conclusion

Finally as discussed by the Italian Institute for International Political Studies (ISPI) Energy Watch, the case around Nord Stream 2 is fading: OPAL has enough capacity! And this reconnects to what we have said before.

We have not yet considered the potential supplies from Iran, Turkmenistan and Iraq that can be connected to the SGC (Southern Gas Corridor), also the Libyan gas potential.

All these aspects will introduce others players in the game but are only expected in the medium-to-long term.

The gas market in Europe is undergoing a great transition in the near future because of the market and other factors.

The EU needs to strengthen its position on energy and have one voice with three aims; energy security, meeting environmental target and energy market prices. It can be difficult if Poland (and Germany) need to preserve coal-fired power stations, or France bans US LNG because of the fracking issue and national interests still prevail.

The North-South Corridor as supported by the Atlantic Council and the development of a Mediterranean Gas Hub are strategic targets to increase security of supplies, unlock the potential of Central Europe and increase trading and economic growth between Africa and Europe.

It is not excluded that Russia will also come up with its stake in the Mediterranean Gas Hub.

It will take time to find a perfect equilibrium for all stakeholders but it is feasible and, profitable in the long run. ■

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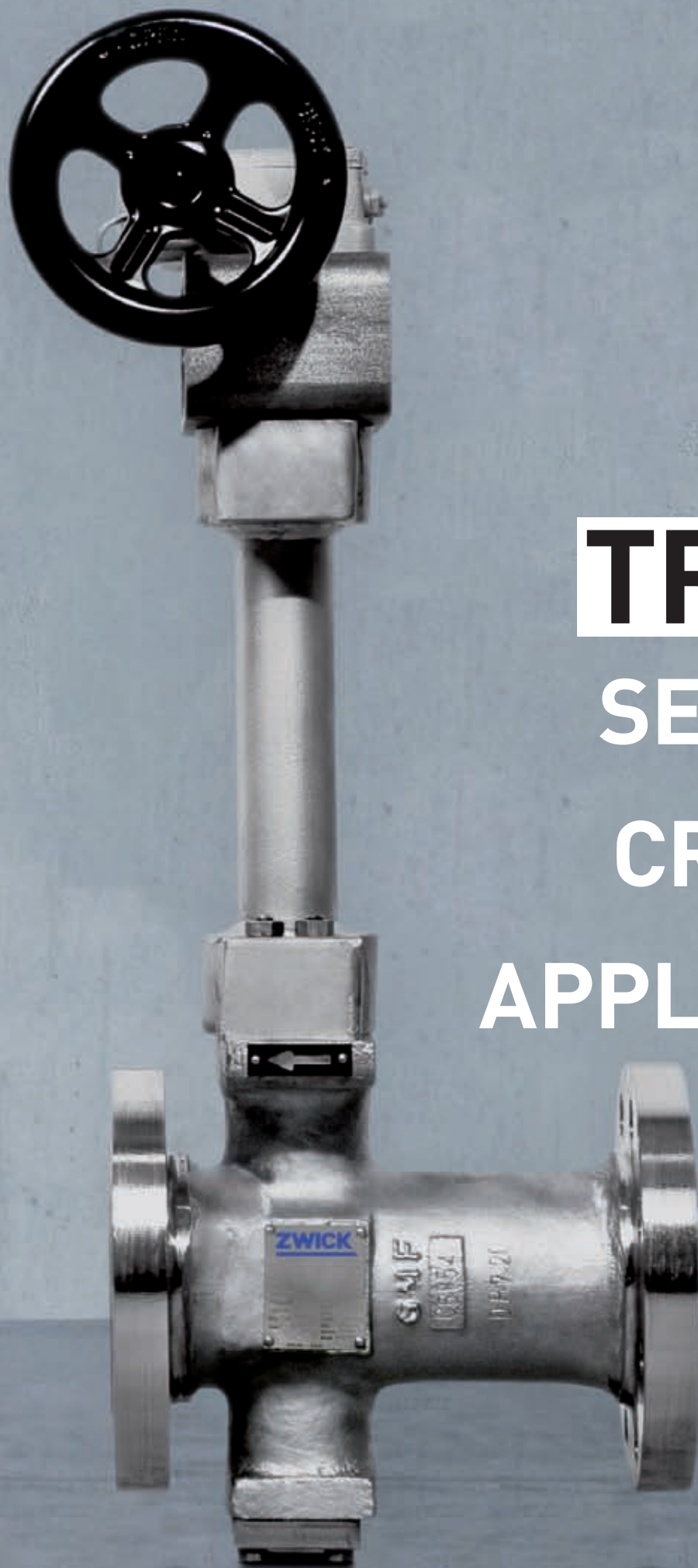
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LNG will eventually face impacts from rising shale-gas output in China amid advances

Sinopec is currently the country's most active player in the industry as others catch up

Shale-gas development in China is likely to influence LNG imports, though such an impact is limited at present and will then build up only gradually.

In the bigger picture, depending on the actual stage of shale-gas development, China's pipeline gas imports as well as overall gas supply will be affected as well, according to a report by the consultancy FACTS Global Energy.

Angles

"Imported LNG is another important leg of China's future gas supply and demand. We see this issue from several angles, including timing, geographic location and infrastructure, total gas demand, and alternative scenarios," the report said.

"In terms of timing, the shale gas supply from within China will take several years to reach credible levels.

"That means any impact of shale gas on LNG will be minimal at least until after 2020. The impact, however, will be felt after the end of this decade, though this also depends on the levels of total gas demand," it added.

For overall Chinese natural gas demand, FGE's view is that the country will have a reasonably fast growth of gas demand that can accommodate future supplies of shale gas as well as imported LNG.

In other words, with growing demand for gas as a whole, the negative impact of shale gas on China's LNG imports will be moderate as there will be sufficient demand for both shale gas and LNG.

Geography

"The issue of geographic locations and infrastructure is also worth mentioning," FGE noted.

"Currently, China's shale-gas E&P concentrate in Sichuan and Chongqing of the Southwest. Although other parts of the country, including the Middle Yangtze region, may be developed, the initial volumes of shale gas will come from remote areas.

"It requires long-distance pipelines to reach the coastal areas, which are the primary targets of imported LNG.

"Last but not least, there are huge uncertainties for China's shale gas development.

"For instance, by 2030, China's shale gas production may be a smaller 4.0 billion standard cubic feet per day (bscf/d) - 31 million tonnes of LNG equivalent, or as high as 8.6 bscf/d (66MT of LNG equivalent).

"The difference is 35MT of LNG equivalent! Since the future prospects of China's conventional gas are limited, a slow growth of shale gas under the low-case scenario will benefit both pipelined gas and LNG imports," the report said.

In short, at present and during the coming years, the report said the impact of China's shale-gas on the country's LNG imports will be limited.

LNG importers will have other factors to consider such as the state of the economy and weak overall energy as well as demand.

Limits

"In the long run after 2020, however, the impact of shale gas will be felt by LNG importers as well as pipeline gas importers.

"At a certain stage in time, shale gas can be competitive as a credible source of supplies.

"Unless there is a large enough demand to accommodate everything, which is not entirely unlikely though, competition among all sources of gas supplies to China - conventional gas, shale gas, other unconventional gas, imported LNG, and imported pipeline gas - can be fierce," FGE said.

The report says Sinopec is currently the most active player in China's shale gas industry, which China National Petroleum Corp (CNPC) and listed affiliate PetroChina playing catch-up and other companies falling far behind.

Auction

"We expect that China's third round shale gas auction may take place later this year. However, given the current situation of low oil prices, it is not surprising if the third round slips to 2017.

"The economics of shale-gas production suffered a serious setback due to the downward adjustment of city-gate gas prices in November 2015, as well as the decreased shale-gas subsidy starting from 2016.



Low-key shale operation in Fuling, southwest China

"However, technology advancement is likely to improve the economics," the report added.

FGE says that moving forward, shale gas remains a formidable future component of China's gas supply because of the role of gas in China's overall energy demand, the advantage of gas among three types of fossil energy, and government support.

All things considered, we project that, under the base-case scenario, China's shale-gas output will reach 2.4 bscf/d by 2020 and 6.4 bscf/d by 2030.

Resources

China's Ministry of Land and Resources (MLR) announced that China's remaining technologically recoverable shale-gas reserves stands at 130.3 billion cubic meters (Bcm) or 4.6 trillion cubic feet (Tcf) by the end of 2015.

"Despite the vast shale-gas resource potential, China's shale gas development has been straddled with challenges such as the complicated geological features, technology constraints and poor economics," the report explained.

China's shale-gas output was merely around 200 million cubic metres (19.4 mmscf/d) in 2013 and 1.3 Bcm (125.8 mmscf/d) in 2014.

Though shale-gas exploration and development attained some advancement in 2015 with output reaching 4.47 Bcm (432.6 mmscf/d), more than triple the output of 2014, the entire shale gas industry still failed to meet its output

target - 6.5 billion cubic metres (628.9 mmscf/d).

Sinopec is currently the most active player in China's shale gas industry.

Ventures

The company is conducting shale-gas exploration activities in several areas around China and has also signed a few Joint Study Agreements (JSA) since 2010 with foreign companies such as BP, ExxonMobil, Chevron, and Total.

Sinopec's most well-known project is its Fuling shale-gas project in Chongqing municipality.

The field is the largest contributor to the company's shale production.

In December 2015, Sinopec announced that its Fuling shale-gas field's production capacity had successfully reached 5 Bcm a year (483.8 million standard cubic feet per day.

The company plans to increase Fuling's production capacity could reach 10 Bcm/y (967.5 mmscf/d) by 2017.

Catch-up

CNPC and affiliated unit PetroChina were actually the first shale-gas explorers in China.

However, with no luck in shale-gas exploration and production (E&P) and the companies' priorities being to focus more on conventional and tight-gas developments, CNPC/PetroChina have been surpassed by Sinopec in the last three years.

CNPC/PetroChina's E&P activities are

mainly in Changning-Weiyuan block (in Sichuan Province) and Zhaotong block (in Yunnan Province).

By the end of 2015, the Changning-Weiyuan block had reached a production capacity of 2 billion cubic metres/y (193.5 mmscf/d), while the Zhaotong block's production capacity reached 550 million cubic metres (53.2 mmscf/d).

In addition, CNPC/PetroChina are the only companies who hold production sharing contracts (PSCs) with foreign companies.

Shell

One signed in 2012 is with Shell to explore the Fushun-Yongchuan block in Sichuan Province.

To date, the development of this Sino-foreign block is moving slowly and with no big progress.

The other, which was signed recently in March 2016, is with BP to explore Neijiang-Dazu block in Sichuan.

Though the final outcome remains to be seen, signing the PSC with BP this year still shows CNPC and PetroChina's determination on the shale-gas front.

In 2015, CNPC/PetroChina's shale gas output was estimated to have accounted for some 30 percent of China's total shale output.

In 2012, China National Offshore Oil

Corp. (CNOOC) started its first inland gas exploration project - the Wuhu venture in Anhui Province. After three years of exploration, CNOOC, in April 2015 announced the suspension of the project as the preliminary work results were not promising.

Lagging

CNOOC, Shaanxi Yanchang Petroleum Group and others are currently falling far behind.

Shaanxi Yanchang Petroleum Group is conducting E&P activities in Yan'an and other parts of the Ordos Basin in Shaanxi Province, where a "continental shale gas demonstration area" was established by National Development and Reform Commission (NDRC) in 2012, but only with a small amount of commercial flow so far.

"Moreover, there are several other state-owned, local or private companies engaged in shale gas business as a result of the second-round bidding concluded in early 2013.

"However, as most of the winners in the second-round bidding do not have sufficient knowledge on shale gas block geology, the progress of these companies in carrying out their obligations has been far slower than expected," the report said.

One question being asked is are there

still more shale gas auction rounds taking place soon?

"After the first- and second-round auctions for shale-gas licenses held by MLR in July 2011 and October 2012, respectively, a previously expected new shale-gas auction round has yet to occur.

"In 2013 and early 2014, a number of private and local companies showed great interests in participating in the third-round bidding.

"However, starting from the end of 2014, there has been less interest for a third round shale-gas auction in the industry. Why is this the case?

"First of all, the investment activities and exploration results of the second-round auction blocks have been disappointing.

Investment

"Impeded by a plethora of challenges and lack of significant capital investment, progress on shale gas E&P on the winning blocks has been slow for many private and local enterprises. "So far, no shale-gas flow has been detected from these 19 blocks. This makes both MLR and potential bidders more cautious about the next shale gas auction round," FGE said.

"Second, under the weak economy, it is not a good time for private companies,

who have less capital and less experience, to enter into the costly shale-gas industry.

"The Chinese government is intended to attract more private companies to the next round auction, which is part of economic reform priorities for oil and gas sectors, but that needs time," the report added.

"Third, the MLR is spending a long time to filter and include in the third round the high-quality shale-gas blocks where commercial gas flow could be more easily found and E&P is less expensive, hoping the third round, unlike the first two rounds, could make a big change to China's shale-gas industry," it stated.

It is reported that the national oil and gas research center, China Geological Survey (CGS), has submitted 40 blocks to MLR as the tender list.

"MLR will eventually pin down around 20 blocks for the third round auction. We expect that the third round shale-gas auction may take place later this year.

"However, given the current situation of low oil prices, it is not surprising if the third round slips to 2017," FGE said. ■

The article is based on the report "Shale Gas in China: Future Prospects with Renewed Efforts to Push Ahead" from FGE consultants.

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Coming soon...



The 2016 issue of *LNG Shipping Review* will contain our usual look at the industry's leading players – owners, managers and operators.

This is an ever changing listing, as more players enter the market and vessels are delivered, change hands, or are deleted by way of recycling.

We will also include a profile of a leading player in the market highlighting the company's LNG involvement, how it got to the position it finds itself in today and its future plans.

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World LNG Carrier Fleet

LNG carrier	Capacity m³	Owned or Ordered by	Builder	Delivery Date	Flag	Power Plant	Cargo System	No. of tanks	Ship built for Export plant
Aamira	266,000	QGTC	Samsung	Dec-10	Liberia	DRL	TZ Mk. III	5	Qatargas IV
Abadi	135,000	Brunei Gas Carriers	Mitsubishi Nagasaki	Jun-02	Brunei	S	Moss	5	Brunei LNG
Abdelkader	177,000	MOL-Itochu	Hyundai	Feb-09	Panama	DFDE	TZ Mk. III	4	Various
Adam LNG	162,000	Oman LNG	Hyundai	Dec-14	Marshall Is.	DFDE	TZ Mk. III	4	Oman LNG
Al Aamriya	210,100	J5 Consortium	Daewoo	Feb-08	Marshall Is.	DRL	GT NO 96	4	Qatargas
Al Areesh	151,700	Teekay LNG	Daewoo	Jan-07	Qatar	S	GT NO 96	4	Ras Gas II
Al Bahiya	266,000	QGTC	Samsung	Oct-09	Liberia	DRL	TZ Mk. III	5	Qatar-Atlantic
Al Biddah	135,275	J4 Consortium	Kawasaki Sakaide	Nov-99	Japan	S	Moss	5	Qatargas
Al Daayen	151,700	Teekay LNG	Daewoo	Apr-07	Qatar	S	GT NO 96	4	RasGas II
Al Dafna	266,000	QGTC	Samsung	Oct-09	Marshall Is.	LR DRL	GT NO 96	4	Qatar-Atlantic
Al Deebel	145,000	Peninsular LNG	Samsung	Dec-05	Bahamas	S	TZ Mk. III	4	Qatargas
Al Gattara	216,200	OSG/Nakilat	Hyundai	Oct-07	Marshall Is.	DRL	TZ Mk. III	4	Qatargas II
Al Ghariya	210,100	ProNav	Daewoo	Feb-08	Bahamas	DRL	GT No. 96	4	Qatargas
Al Gharaffa	216,200	OSG/Nakilat	Hyundai	Jan-08	Marshall Is.	DRL	TZ Mk. III	4	Various
Al Ghashamiya	216,000	QGTC	Samsung	Mar-09	Liberia	DRL	TZ Mk. III	4	Qatar-Atlantic Basin
Al Ghuwairiya	261,700	QGTC	Daewoo	Aug-08	Marshall Is.	DRL	GT NO. 96	5	Qatar-Atl’c Basin
Al Hamla	216,000	OSG	Samsung	Feb-08	Marshall Is.	DRL	TZ Mk. III	4	QatarGas
Al Hamra	137,000	National Gas Shipping	Kvaerner-Masa	Jan-97	Liberia	S	Moss	4	ADGAS
Al Huwaila	217,000	Teekay	Samsung	May-08	Bahamas	DRL	TZ Mk. III	4	RasGas III
Al Jasra	137,100	J4 Consortium	Mitsubishi Nagasaki	Jul-00	Japan	S	Moss	5	Qatargas
Al Jassasiya	145,700	Maran-Nakilat	Daewoo	May-07	Greece	S	GT No 96	4	RasGas
Al Kharaitiyat	216,200	QGTC	Hyundai	May-09	Liberia	DRL	TZ Mk. III	4	Qatargas III
Al Kharaana	210,000	QGTC	Daewoo	Oct-09	Marshall Is.	DRL	GT NO 96	4	Qatargas IV
Al Kharsaah	217,000	Teekay	Samsung	May-08	Bahamas	DRL	TZ Mk. III	4	RasGas III
Al Khattiya	210,000	QGTC	DSME	Oct-09	Marshall Is.	DRL	GT No. 96	4	Qatargas IV
Al Khaznah	135,500	National Gas Shipping	Mitsui Chiba	Jun-94	Liberia	S	Moss	5	ADGAS
Al Khor	137,350	J4 Consortium	Mitsubishi Nagasaki	Dec-96	Japan	S	Moss	5	Qatargas
Al Khuwair	217,000	Teekay LNG	Samsung	Jul-08	Korea	DRL	TZ Mk. III	4	RasGas
Al Mafyar	266,000	OSG/Nakilat	Hyundai	Oct-07	Marshall Is.	DRL	TZ Mk. III	4	Qatargas II
Al Marrouna	151,700	Teekay	Daewoo	Nov-07	Bahamas	S	GT NO 96		Ras Gas I
Al Mayeda	266,000	QGTC	Samsung	Jan-09	Liberia	DRL	TZ Mk. III	5	Qatar-US/Var.
Al Nuaman	210,000	QGTC	DSME	Dec-09	Marshall Is.	DRL	GT No. 96	4	Qatargas IV
Al Oraiq	210,000	J5 Consortium	Daewoo	Apr-08	Marshall Is.	DRL	GT No. 96	4	Various
Al Rayyan	135,360	J4 Consortium	Kawasaki Sakaide	Mar-97	Japan	S	Moss	5	Qatargas
Al Rekayyat	216,200	QGTC	Hyundai	Jun-09	Bahamas	DRL	TZ Mk.III	4	Qatar-Atlantic
Al Ruwais	210,100	ProNav	Daewoo	Nov-07	Germany	DRL	GT NO 96	4	Qatargas II
Al Sadd	210,100	QGTC	Daewoo	Mar-09	Liberia	DRL	GT NO 96	4	Qatar-Atlantic Basin
Al Safliya	210,100	ProNav	Daewoo	Dec-07	Bahamas	DRL	GT NO 96	4	Qatargas II
Al Sahla	216,200	J5	Hyundai	Jun-08	Japan	DRL	TZ Mk. III	4	Ras Gas III
Al Samriya	261,700	QGTC	Daewoo	Sep-08	Marshall Is.	DRL	GT NO. 96	5	Qatargas II
Al Sheehaniya	210,100	QGTC	Daewoo	Feb-09	Liberia	DRL	GT NO 96	4	Qatar-Atlantic Basin
Al Shamal	217,000	Teekay LNG	Samsung	Jun-08	Qatar	DRL	TZ Mk. III	4	RasGas
Al Thakhira	145,000	Peninsular LNG	Samsung	Sep-05	Bahamas	S	TZ Mk. III	4	Qatargas
Al Thumama	216,000	J5 Consortium	Hyundai	Apr-08	Japan	DRL	TZ Mk. III	4	Rasgas
Al Utouriya	215,000	J5	Hyundai	Sep-08	Panama	DRL	TZ Mk. III	4	RasGas
Al Utourma	215,000	J5	Hyundai	Sep-08	Panama	DRL	TZ Mk. III	4	Ras Gas III
Al Wajbah	137,350	J4 Consortium	Mitsubishi Nagasaki	Jun-97	Japan	S	Moss	5	Qatargas
Al Wakrah	135,360	J4 Consortium	Kawasaki Sakaide	Dec-98	Japan	S	Moss	5	Qatargas
Al Zhubarah	137,570	J4 Consortium	Mitsui Chiba	Dec-96	Japan	S	Moss	5	Qatargas
Alto Acrux	147,000	LNG Marine Transport	Mitsubishi	Mar-08	Bahamas	S	Moss	4	Various
Amali	148,000	Brunei-Shell	DSME	Jul-11	Brunei	DFDE	GT No. 96	4	Brunei LNG
Amanl	154,800	Brunei-Shell	Hyundai	Nov-14	Brunei	DFDE	TZ Mk. III	4	Brunei LNG
Aman Bintulu	18,928	Perbadanan / NYK Line	NKK Tsu	Oct-93	Malaysia	S	TZ Mk. III	3	Petronas
Aman Hakata	18,800	Perbadanan / NYK Line	NKK Tsu	Nov-98	Malaysia	S	TZ Mk. III	3	Petronas
Aman Sendai	18,928	Perbadanan / NYK Line	NKK Tsu	May-97	Malaysia	S	TZ Mk. III	3	Petronas
Arctic Aurora	160,000	Dynagas	Hyundai	Jul-13	Marshall Is.	DFDE	TZ Mk. III	4	Various
Arctic Discoverer	140,000	K Line	Mitsui Chiba	Jan-06	Bahamas	S	Moss	4	Various
Arctic Lady	147,200	MOL/Hoegh LNG	Mitsubishi Nagasaki	Apr-86	Norway	S	Moss	4	Various
Arctic Princess	147,200	MOL/Hoegh LNG	Mitsubishi Nagasaki	Jan-06	Norway	S	Moss	4	Various
Arctic Sun	89,880	Arctic LNG Shipping	IHI Chita	Dec-93	Liberia	S	IHI SPB	4	ConocoPhillips/Marathon
Arctic Voyager	140,000	K Line	Kawasaki	Jul-06	Bahamas	S	Moss	4	Statoil
Arkat	148,000	Brunei-Shell	DSME	Feb-11	Brunei	DFDE	GT. No. 96	4	Brunei LNG
Arwa Spirit	165,000	Teekay LNG	Samsung	Sep-08	Marshall Is.	DFDE	TZ Mk. III	4	Various
Asia Endeavour	160,000	Chevron	Samsung	Dec-14	Bahamas	DFDE	TZ Mk. III	4	Various
Asia Energy	160,000	Chevron	Samsung	Sept-14	Bahamas	DFDE	TZ Mk. III	4	Various
Asia Excellence	160,000	Chevron	Samsung	Sept-13	Bahamas	DFDE	TZ Mk. III	4	Various
Asia Vision	160,000	Chevron	Samsung	June-14	Bahamas	DFDE	TZ Mk. III	4	Various
Barcelona Knutsen	173,400	Knutsen	Daewoo	May-10	N.I.S.	DFDE	GT NO 96	4	Various
Bebatic	75,060	Brunei Shell Tankers	Atlantique	Oct-72	Brunei	S	TZ Mk. I	6	Brunei LNG
Beidou Star	172,000	MOL	Hudong	Oct-15	Hong Kong	DRL	GT NO. 96	4	Various
Berge Arzew	138,088	BW Gas	Daewoo	Jul-04	Norway	S	GT NO 96	4	Sonatrach
BW GDF-Suez Boston	138,059	BW Gas	Daewoo	Jan-03	Norway	S	GT NO 96	4	Suez LN
BW GDF Suez Everett	138,028	BW Gas	Daewoo	Jun-03	Norway	S	GT NO 96	4	Suez LNG
Bilbao Knutsen	138,000	Knutsen / Marpetrol	IZAR Sestao	Jan-04	Spain	S	GT NO 96	4	Atlantic LNG
Bilis	77,730	Brunei Shell Tankers	La Seyne	Mar-75	Brunei	S	GT NO 82	5	Brunei LNG
Bishu Maru	162,000	K Line-Transpacific	Kawasaki Sakaide	Dec-15	Panama	S	Moss	4	Australia-Japan
British Diamond	155,000	BP Shipping	Hyundai	Sep-08	IOM	DFDE	TZ Mk. II	4	Indonesia-Various
British Emerald	155,000	BP Shipping	Hyundai	Jun-07	UK	DFDE	TZ Mk. III	4	Tangguh LNG
British Innovator	138,200	BP Shipping	Samsung	Jul-03	Isle of Man	S	TZ Mk. III	4	Various

British Merchant	138,000	BP Shipping	Samsung	Apr-03	Isle of Man	S	TZ Mk. III	4	Various
British Ruby	155,000	BP Shipping	Hyundai	Jan-08	U.K.	DFDE	TZ Mk. III	4	Various
British Sapphire	155,000	BP Shipping	Hyundai	Sep-08	IOM	DFDE	TZ Mk. III	4	Tangguh
British Trader	138,000	BP Shipping	Samsung	Dec-02	Isle of Man	S	TZ Mk. III	4	Engas
Broog	135,466	J4 Consortium	Mitsui Chiba	May-98	Japan	S	Moss	5	Qatargas
Bu Samara	266,000	QGTC	Samsung	Dec-08	Qatar	DRL	TZ Mk. III	5	Qatargas
BW Suez Paris	162,400	BW Gas	Daewoo	May-09	N.I.S.	DFDE	GT NO 96	4	Yemen-Atlantic
BW Suez Brussels	162,400	BW Gas	Daewoo	May-09	N.I.S.	DFDE	GT NO 96	4	Yemen-Atlantic
Cadiz Knutsen	138,826	Knutsen / Marpetrol	IZAR Puerto Real	Jun-04	Spain	S	GT NO 96	4	Engas
Castillo de Santisteban	173,600	Elcano	STX	Aug-10	Malta	S	GT NO. 96		Various
Castillo de Villalba	138,000	Elcano	IZAR	Nov-03	Spain	S	GT NO 96	4	Sonatrach
Catalunya Spirit	138,000	Teekay LNG Partners	IZAR Sestao	Mar-03	Liberia	S	GT NO 96	4	Atlantic LNG
Celestine River	145,000	KLNG	Kawasaki	Dec-07	Bahamas	S	Moss		Various
Cheikh Bouamama	75,500	Skikda LNG Transport	USC	Jul-08	Bahamas	S	TZ Mk. III	4	Sonatrach
Cheikh El Mokrani	75,500	Med LNG Corp	USC	Jun-07	Bahamas	S	TZ Mk. III	4	Sonatrach
Clean Energy	150,000	Pegasus Shiph'd	Hyundai	Mar-07	Marshall Is.	S	TZ Mk. III	4	Various
Clean Force	150,000	Seacrown Mariti	Hyundai	Jan-08	Marshall Is.	S	TZ Mk. III	4	Various
Clean Ocean	155,900	Dynagas	Hyundai	Mar-14	Marshall Is.	DFDE	TZ Mk. III	4	Various
Clean Planet	155,900	Dynagas	Hyundai	Mar-14	Marshall Is.	DFDE	TZ Mk. III	4	Various
Clean Vision	160,000	Dynagas	Hyundai	Jun-15	Marshall Is.	DFDE	TZ Mk. III	4	Various
Cool Explorer	160,000	Thenamaris	Samsung	Oct-13	Bermuda	DFDE	TZ Mk. III	4	Various
Cool Runner	160,000	Thenamaris	Samsung	May-14	Bermuda	DFDE	TZ Mk. III	4	Various
Cool Voyager	160,000	Thenamaris	Samsung	Oct-13	Bermuda	DFDE	TZ Mk. III	4	Various
Corcovado LNG	160,106	TMSC Gas	Daewoo	Jun-14	Malta	TFDE	GT No 96	4	Various
Creole Spirit	174,000	Teekay	Daewoo	Jan-16	Bahamas	MEGI-DF	NO. 96 GW	4	Cheniere
Cubal	160,400	Mitsui/NYK/Teekay	Samsung	Jan-12	Bahamas	DFDE	TZ Mk. III	4	Various
Cygnus Passage	145,400	Cygnus LNG	Mitsubishi	Feb-09	Panama	S	Moss	4	Various
Dapeng Moon	147,000	China Ships	Hudong	Jul-09	China	S	GT NO 96	4	Various
Dapeng Star	147,000	China Ships	Hudong	Nov-09	China	S	GT NO 96	4	Various
Dapeng Sun	147,000	China Ships	Hudong	Jul-07	China	S	GT NO 96	4	Woodside Energy
Disha	136,000	Petronet LNG Ltd.	Daewoo	Jan-04	Malta	S	GT NO 96	4	Qatargas
Doha	137,350	J4 Consortium	Mitsubishi Nagasaki	Jun-99	Japan	S	Moss	5	Qatargas
Duhail	210,100	ProNav	Daewoo	Jan-08	Germany	DRL	GT NO 96	4	Various
Dukhan	135,000	J4 Consortium	Mitsui Chiba	Oct-04	Japan	S	Moss	4	Qatargas
Dwiputra	127,385	Humpuss Consortium	Mitsubishi Nagasaki	Mar-94	Bahamas	S	Moss	4	Pertamina
Ebisu	147,547	Golar LNG	Kawasaki	Sep-08	Bahamas	S	Moss	4	Various
Ejnan	145,000	4J	Samsung	Jan-07	Bahamas	S	TZ Mk. III		RasGas
Ekaputra	136,400	Humpuss Consortium	Mitsubishi Nagasaki	Jan-90	Liberia	S	Moss	5	Pertamina
Energy Advance	145,000	Tokyo LNG Tankers	Kawasaki Sakaide	Mar-05	Japan	S	Moss	4	Darwin
Energy Atlantic	159,924	Alpha	STX Jinhae	Sep-15	Malta	DFDE	No. 96	4	Various
Energy Confidence	155,000	Tokyo LNG Tankers	Kawasaki	Apr-09	Panama	S	Moss	4	Various
Energy Frontier	147,600	Tokyo LNG Tankers	Kawasaki Sakaide	Sep-03	Japan	S	Moss	4	Darwin
Energy Horizon	177,000	Tokyo LNG Tankers	Kawasaki	Jul-11	Japan	S	Moss	4	Pluto LNG
Energy Navigator	147,000	Tokyo LNG Tankers	Kawasaki Sakaide	May-08	Japan	S	Moss	4	Various
Energy Progress	145,000	MOL	Kawasaki	Nov-06	Japan	S	Moss	4	Bayu Undan LNG
Esshu Maru	162,000	K Line-Transpacific	Kawasaki Sakaide	Dec-14	Panama	S	Moss	4	Australia-Japan
Excalibur	138,200	Exmar/ Excelerate	Daewoo	Oct-02	Belgium	S	GT NO 96	4	Various
Excel	138,106	Exmar/ MOL	Daewoo	Sep-03	Belgium	S	GT NO 96	4	Various
Excelerate	138,000	Exmar/Excelerate	Daewoo	Oct-06	Belgium	S	GT NO 96	4	Various
Excellence	138,000	GKFF Ltd.	Daewoo	May-05	Belgium	S	GT NO 96	4	Excelerate Energy
Excelsior	138,000	Exmar	Daewoo	Jan-05	Belgium	S	GT NO 96	4	Various
Exemplar	150,900	Excelerate	Daewoo	Jun-10	Belgium	S	GT NO 96	4	Various
Expedient	151,000	Excelerate	Daewoo	Nov-09	Belgium	S	GT NO 96	4	Various
Experience RV	174,000	Exmar/Excelerate	Daewoo	Jul-14	Marshall Is.	DFDE	GT NO 96		Various
Explorer	150,900	Exmar/Excelerate	Daewoo	Mar-08	Belgium	S	GT NO 96	4	Excelerate
Express	151,000	Exmar/Excelerate	Daewoo	May-09	Belgium	S	GT NO 96	4	Various
Exquisite	150,900	Excelerate	Daewoo	Sep-09	Belgium	S	GT NO. 96	4	Various
Fraiha	210,100	J5 Consortium	Daewoo	Sep-08	Marshall Is.	DRL	GT NO 96	4	Qatargas
FSRU Independence	170,000	Hoegh	Hyundai	Feb-14	NIS	DFDE	TZ Mk. III	4	Various
FSRU Lampung	170,000	Hoegh	Hyundai	May-14	Indonesia	DFDE	TZ Mk. III	4	Various
Fuji LNG	147,895	TMSC Gas	Kawasaki	Jun-04	Malta	S	Moss	4	Various
Fuwairit	138,000	Peninsular LNG	Samsung	Jan-04	Bahamas	S	TZ Mk. III	4	RasGas II
Galea	134,425	Shell Shipping	Mitsubishi Nagasaki	Oct-02	Singapore	S	Moss	5	Shell
Galia Spirit	140,620	Teekay LNG Partners	Daewoo	Jul-04	Liberia	S	GT NO 96	4	Engas
Gaselys	153,500	GdF/NYK	Atlantique	Mar-07	France	DFDE	CS 1	4	Engas
Gallina	134,425	Shell Shipping	Mitsubishi Nagasaki	Oct-02	Singapore	S	Moss	5	Shell
GasLog Chelsea	153,000	GasLog	Hanjin Korea	Dec-09	Panama	TFDE	TZ Mk. III	4	Various
GasLog Salem	165,000	GasLog	Samsung	Apr-15	Liberia	TFDE	TZ Mk. III	4	various
GasLog Santiago	155,000	GasLog	Samsung	Mar-13	Liberia	TFDE	TZ Mk. III	4	Various
GasLog Saratoga	155,000	GasLog	Samsung	Dec-14	Bermuda	TFDE	TZ Mk. III	4	Various
Gaslog Savannah	155,000	GasLog	Samsung	May-10	Bermuda	DFDE	TZ Mk. III	4	Various
GasLog Seattle	155,000	GasLog	Samsung	Oct-13	Bermuda	TFDE	TZ Mk. III	4	Various
GasLog Shanghai	155,000	GasLog	Samsung	Jan-13	Liberia	TFDE	TZ Mk. III	4	Various
Gaslog Singapore	155,000	GasLog	Samsung	Jul-10	Bermuda	DFDE	TZ Mk. III	4	Various
Gaslog Skagen	155,000	GasLog	Samsung	Oct-13	Bermuda	DFDE	TZ Mk. III	4	Various
Gaslog Sydney	155,000	GasLog	Samsung	May-13	Bermuda	DFDE	TZ Mk. III	4	Various
GDF-Suez Global Energy	74,000	Gaz de France	Chantiers	Dec-06	France	DFDE	CS1	4	Sonatrach
GDF-Suez Cape Ann	145,000	Hoegh LNG/MOL	Samsung	May-10	Liberia	DFDE	TZ Mk. III	4	Various
GDF-Suez Neptune	145,000	Hoegh LNG/MOL	Samsung	Dec-09	Liberia	DFDE	TZ Mk. III	4	Various
GDF-Suez Point Fortin	154,200	LNG Japan	Imabari/Koyo	Feb-10	Panama	DFDE	TZ Mk. III	4	Various
Gemmata	138,100	Shell Shipping	Mitsubishi Nagasaki	Mar-04	Singapore	S	Moss	5	Shell
Ghasha	137,510	National Gas Shipping	Mitsui	Jun-95	Liberia	S	Moss	5	ADGAS
Golar Arctic	140,645	Golar LNG	Daewoo	Dec-03	Marshall Is.	S	GT NO 96	4	Shell Spot
Golar Bear	160,000	Golar	Samsung	Mar-14	Bermuda	DFDE	TZ Mk. III	4	Various

CARRIER FLEET

Golar Celsius	160,000	Golar LNG	Samsung	Sep-13	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Crystal	160,000	Golar LNG	Samsung	Oct-13	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Eskimo (FSRU)	160,000	Golar LNG	Samsung	Jan-15	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Freeze	125,850	Golar LNG	HDW	Feb-77	UK	S	Moss	5	Various
Golar Glacier	162,000	Golar LNG	Hyundai	Sep-14	Marshall Is.	DFDE	TZ Mk. III	4	Various
Golar Grand	145,880	Golar LNG	Daewoo	2006	IoM		GT NO 96	4	Various
Golar Ice	160,000	Golar LNG	Samsung	Feb-15	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Igloo (FSRU)	160,000	Golar LNG	Samsung	Oct-13	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Kelvin	160,000	Golar LNG	Samsung	Jan-15	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Maria	145,950	Golar LNG	Daewoo	2006	Marshall Is.		GT NO 96	4	Various
Golar Mazo	135,225	Golar LNG/CPP	Mitsubishi	Jan-00	Liberia	S	Moss	5	Pertamina
Golar Penguin	160,000	Golar LNG	Samsung	Mar-14	Marshall Is.	DFDE	TZ Mk. III	4	Various
Golar Seal	160,000	Golar LNG	Samsung	Aug-13	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Singapore (FSRU)	160,000	Golar LNG	Samsung	June-15	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Snow	160,000	Golar LNG	Samsung	Jan-15	Bermuda	DFDE	TZ Mk. III	4	various
Golar Tundra (FSRU)	160,000	Golar LNG	Samsung	Dec-15	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Viking	140,000	Golar LNG	Hyundai	Jan-05	Marshall Is.	S	Moss	4	Various
Golar Winter	138,250	Golar LNG	Daewoo	Apr-04	Marshall Is.	S	GT NO 96	4	Petrobras
Grace Acacia	150,000	Algaet Shipping	Hyundai	Jan-07	Japan	S	TK MK III	4	Various
Grace Barleria	150,000	Swallowtail Ship	Hyundai	Oct-07	Japan	S	TZ Mk. III	4	Various
Grace Cosmos	150,000	AGH Shipping	Hyundai	Mar-08	Japan	S	TZ Mk. III	4	Various
Grace Dahlia	177,000	Tokyo Gas	Kawasaki	Oct-13	Japan	S	Moss	4	Various
Gracilis	138,830	Golar LNG	Hyundai	Jan-05	Marshall Is.	S	TZ Mk. III	4	Shell BG
Granatina	140,645	Shell Shipping	Daewoo	Dec-03	Singapore	S	GT NO 96	4	Shell
Grand Aniva	147,200	Sovcomflot/NYK	Mitsubishi	Jan-08	Japan	S	Moss	4	Various
Grand Elena	147,200	Sovcomflot/NYK	Mitsubishi	Oct-07	Japan	S	Moss	4	Various
Grand Mereya	147,200	Primorsk/MOL/K Line	Chiba	May-08	Japan	S	Moss	4	Sakhalin II
Hanjin Muscat	138,200	Hanjin Shipping	Hanjin	Jul-99	Panama	S	GT NO 96	4	Oman Gas
Hanjin Pyeong Taek	130,600	Hanjin Shipping	Hanjin	Sep-95	Panama	S	GT NO 96	4	Pertamina
Hanjin Ras Laffan	138,214	Hanjin Shipping	Hanjin	Jul-00	Panama	S	GT NO 96	4	QatarGas
Hanjin Sur	138,333	Hanjin Shipping	Hanjin	Jan-00	Panama	S	GT NO 96	4	Oman Gas
Hispania Spirit	140,500	Teekay LNG Partners	Daewoo	Sep-02	Spain	S	GT NO 96	4	Atlantic LNG
Hoegh Gallant FSRU	170,050	Hoegh LNG	Hoegh Hyundai	May-14	Marshall Is.	DFDE	TZ Mk. III	4	chartered
Hoegh Grace FSRU	170,050	Hoegh LNG	Hoegh LNG Hyundai	May-15	Marshall Is.	DFDE	TZ Mk. III	4	various
Hyundai Aquapia	135,000	Hyundai MM	Hyundai	Mar-00	Panama	S	Moss	4	Oman Gas
Hyundai	135,000	Hyundai MM	Hyundai	Jan-00	Panama	S	Moss	4	RasGas
Hyundai Ecopia	145,000	Hyundai	Hyundai	Nov-08	Panama	S	TZ Mk. III	4	Various
Hyundai Greenpia	125,000	Hyundai MM	Hyundai	Nov-96	Panama	S	Moss	4	Pertamina
Hyundai Oceanpia	135,000	Hyundai MM	Hyundai	Jul-00	Panama	S	Moss	4	Oman Gas
Hyundai Technopia	135,000	Hyundai MM	Hyundai	Jul-00	Panama	S	Moss	4	RasGas
Hyundai Utopia	125,182	Hyundai MM	Hyundai	Jun-94	Panama	S	Moss	4	Pertamina
Iberica Knutsen	138,000	Knutsen OAS	Daewoo	Aug-06	Norway	S	GT 96	4	Gas Natural
Ibra LNG	147,100	Oman Gas	Samsung	Jun-06	Panama	S	TK Mk. III	4	Oman LNG
Ibri LNG	145,000	Oman Gas	Mitsubishi	Jul-06	Panama	S	TK Mk. III	4	Oman LNG
Ish	137,540	National Gas Shipping	Mitsubishi Nagasaki	Nov-95	Liberia	S	Moss	5	ADGAS
K Acacia	138,017	Korea Line	Daewoo	Jan-00	Panama	S	GT NO 96	4	Oman Gas
K Freesia	135,256	Korea Line	Daewoo	Jun-00	Panama	S	GT NO 96	4	RasGas
K Jasmine	145,700	Korea Line	Daewoo	Mar-08	Panama	S	GT NO 96	4	Kogas offtake
K Mugungwha	152,000	K Line	Daewoo	Nov-08	Panama	S	GT NO 96	4	Various
Kita LNG	160,106	TMSC Gas	Daewoo	Jun-14	Malta	TFDE	GT No 96	4	Various
Kotawaka Maru	125,200	J3 Consortium	Kawasaki Sakaide	Jan-84	Japan	S	Moss	5	Darwin
Lala Fatma N'Soumer	145,000	Algeria Nippon Gas	Kawasaki Sakaide	Dec-04	Japan	S	Moss	4	Sonatrach
Larbi Ben M'Hidi	129,750	SNTM-Hyproc	La Seyne	Jun-77	Algeria	S	GT NO 85	5	Sonatrach
Lijmilya	261,700	QGTC	Daewoo	Sep-08	Marshall Is.	DRL	GT NO. 96	5	Various
LNG Abuja	126,530	Bonny Gas Transport	GD Quincy	Sep-80	Bahamas	S	Moss	5	Nigeria LNG
LNG Adamawa	141,000	Bonny Gas Transport	Hyundai	Jun-05	Bermuda	S	Moss	4	Various
LNG Akwa Ibom	141,000	Bonny Gas Transport	Hyundai	Nov-04	Bermuda	S	Moss	4	Various
LNG Aquarius	126,300	MOL/LNG Japan	GD Quincy	Jun-77	Marshall Is.	S	Moss	5	Various
LNG Barka	153,000	NYK	Kawasaki	Jan-09	Bahamas	S	Moss	4	Various
LNG Bayelsa	137,500	Bonny Gas Transport	Hyundai	Feb-03	Bermuda	S	Moss	4	Nigeria LNG
LNG Benue	145,700	BW Gas	Daewoo	Mar-06	Bermuda	S	GT NO 96	4	Nigeria LNG
LNG Bonny	177,000	Bonny Gas Transport	Hyundai	Oct-15	Bermuda	DFDE	TZ Mk III	4	Nigeria LNG
LNG Borno	149,600	NYK Line	Samsung	Aug-07	Japan	S	TZ Mk. III	4	Nigeria LNG
LNG Capricorn	126,300	MOL/LNG Japan	GD Quincy	Jun-78	Marshall Is.	S	Moss	5	Pertamina
LNG Cross River	141,000	Bonny Gas Transport	Hyundai	Sep-05	Bermuda	S	Moss	4	Various
LNG Dream	145,000	Osaka Gas	Kawasaki	Sep-06	Japan	S	Moss	4	Woodside Energy
LNG Ebisu	147,500	MOL	Kawasaki	Sep-08	Bahamas	S	Moss	4	Various
LNG Edo	126,530	Bonny Gas Transport	GD Quincy	May-80	Bahamas	S	Moss	5	Nigeria LNG
LNG Enugu	145,000	BW Gas	Daewoo	Oct-05	Bermuda	S	GT NO 96	4	Nigeria LNG
LNG Fimina	175,000	Bonny Gas Transport	Samsung	Oct-15	Bermuda	DFDE	TZ Mk III	4	Nigeria LNG
LNG Flora	127,700	J3 Consortium	Kawasaki Sakaide	Mar-93	Japan	S	Moss	4	Pertamina
LNG Fukurokuju	165,000	MOL	Kawasaki	June-15	Japan	S	Moss	4	Various
LNG Gemini	126,300	MOL/LNG Japan	GD Quincy	Sep-78	Marshall Is.	S	Moss	5	Pertamina
LNG Imo	148,300	BW Gas	Daewoo	Jun-08	Bermuda	S	GT NO 96	4	Nigeria LNG
LNG Jamal	135,330	Osaka Gas/J3 Consortium	Mitsubishi Nagasaki	Oct-00	Japan	S	Moss	5	Oman Gas
LNG Jupiter	145,000	NYK Line	Kawasaki	Jul-09	Bahamas	S	Moss	4	Various
LNG Jurojin	155,300	MOL	MHI Nagasaki	Nov-15	Japan	S	KM	4	Various
LNG Kano	148,471	BW Gas	Daewoo	Jan-07	Bermuda	S	GT No. 96	4	NLNG
LNG Lagos	177,000	Bonny Gas	Hyundai	Oct-15	Bermuda	DFDE	TZ Mk III	4	Nigeria LNG
LNG Leo	126,400	MOL/LNG Japan	GD Quincy	Dec-78	Marshall Is.	S	Moss	5	Pertamina
LNG Lerici	65,000	Exmar	Italcantieri Sestri	Mar-98	Italy	S	GT NO 96	4	Sonatrach
LNG Libra	126,400	Hoegh LNG	GD Quincy	Apr-79	Marshall Is.	S	Moss	5	Various
LNG Lokoja	148,300	BW Gas	Daewoo	Dec-06	Bermuda	S	GT No. 96	4	Nigeria LNG
LNG Ogun	148,300	NYK Line	Samsung	Aug-07	Japan	S	TZ Mk. III	4	Nigeria LNG
LNG Ondo	148,300	BW Gas	Daewoo	Sep-07	Bermuda	S	GT NO 96	4	Nigeria LNG

LNG Oyo	140,500	BW Gas	Daewoo	Dec-05	Bermuda	S	GT NO 96	4	Nigeria LNG
LNG Pioneer	138,000	MOL	Daewoo	Jul-05	Bahamas	S	GT No 96	4	Idku
LNG Port Harcourt	175,000	Bonny Gas	Samsung	Oct-15	Bermuda	DFDE	TZ Mk III	4	Nigeria LNG
LNG Portovenere	65,000	Exmar	Italcantieri Sestri	Jun-96	Italy	S	GT No 96	4	Sonatrach
LNG River Niger	141,000	Bonny Gas Transport	Hyundai	May-06	Bermuda	S	Moss	4	Various
LNG River Orashi	145,910	BW Gas	Daewoo	Nov-04	Bermuda	S	GT No 96	4	Nigeria LNG
LNG Rivers	137,231	Bonny Gas Transport	Hyundai	Jun-02	Bermuda	S	Moss	4	Nigeria LNG
LNG Saturn	153,000	MOL	MHI	Nov-15	Japan	S	Moss	4	Various
LNG Sokoto	137,231	Bonny Gas Transport	Hyundai	Aug-02	Bermuda	S	Moss	4	Nigeria LNG
LNG Taurus	126,300	MOL/LNG Japan	GD Quincy	Aug-79	Marshall Is.	S	Moss	5	Various
LNG Venus	155,000	Osaka/MOL	MHI	Oct-14	Japan	S	Moss	4	Various
LNG Vesta	127,547	Tokyo Gas Consortium	Mitsubishi Nagasaki	Jun-94	Japan	S	Moss	4	Pertamina
LNG Virgo	126,400	MOL/LNG Japan	GD Quincy	Dec-79	Marshall Is.	S	Moss	5	Pertamina
Lobito	160,400	Mitsui/NYK/Teekay	Samsung	Oct-11	Bahamas	DFDE	TZ Mk. III	4	Various
Lusail	138,000	Peninsular LNG	Samsung	May-05	Bahamas	S	TZ Mk. III	4	Qatar
Madrid Spirit	138,000	Teekay LNG Partners	IZAR Puerto Real	Jan-05	Spain	S	GT No 96	4	Engas
Magellan Spirit	165,500	Teekay LNG Partners	Samsung	Sep-08	Denmark	DFDE	TZ Mk. III	4	Various
Malanje	160,400	Mitsui/NYK/Teekay	Samsung	Jul-11	Bahamas	DFDE	TZ Mk. III	4	Various
Maran Gas Alexandria	161,870	Maran	Hyundai Samho	Sep-15	Greece	DFDE	TZ Mk. III	4	Various
Maran Gas Apollonia	161,870	Maran	Daewoo	Jan-14	Greece	DFDE	GT No 96	4	Various
Maran Gas Asclepius	145,000	Kristen Navigation	Daewoo	Jul-05	Bermuda	S	GT No 96	4	Qatar
Maran Gas Coronis	145,700	Maran	Daewoo	Sep-07	Greece	S	GT No 96	4	Rasgas II
Maran Gas Delphi	159,800	Maran	Daewoo	Feb-14	Greece	DFDE	GT No 96	4	Various
Maran Gas Efessos	159,800	Maran	Daewoo	Jun-14	Greece	DFDE	GT No 96	4	Various
Maran Gas Lindos	159,800	Maran	Daewoo	Jun-15	Greece	DFDE	GT No. 96	4	Various
Maran Gas Mystras	155,900	Maran Gas	Daewoo	May-15	Greece	DFDE	GT No 96	4	various
Maran Gas Posidonia	161,870	Maran	Daewoo	May-14	Greece	DFDE	GT No 96	4	Various
Maran Gas Sparta	161,870	Maran	Hyundai Samho	April-15	Greece	DFDE	G TZ Mk. III	4	Various
Maran Gas Troy	155,900	Maran Gas	Daewoo	May-15	Greece	DFDE	GT No 96	4	various
Maria Energy	174,000	Tsakos	Hyundai	Mar-15	Marshall Is.	TFDE	GTT Mk II	4	Various
Marib Spirit	165,000	Teekay LNG	Samsung	May-08	Marshall Is.	DFDE	TZ Mk. III	4	Various
Matthew	126,540	Suez LNG Shiping	Newport News	Jun-79	Bahamas	S	TZ Mk. I	6	Atlantic LNG
Mekaines	266,000	Nakililat	Samsung	Mar-09	Liberia	DRL	GT No 96	4	Qatar-Atlantic Basin
Meridian Spirit	165,500	Teekay LNG	Samsung	Jan-10	Denmark	DFDE	TZ Mk. III	4	Various
Mesaimeer	210,100	Nakililat	Hyundai	Mar-09	Liberia	DRL	GT No 96	4	Qatar-Atlantic Basin
Methane Alison Victoria	145,000	GasLog	Samsung	Aug-07	Bermuda	S	TZ III	4	Eq.Guinea LNG
Methane Becki Anne	170,000	GasLog	Samsung	Sep-10	Bermuda	TFDE	TZ Mk. III	4	Various
Methane Heather Sally	145,000	GasLog	Samsung	Jul-07	Bermuda	S	Tz Mk. III	4	Eq.Guinea LNG
Methane Jane Elizabeth	145,000	GasLog	Samsung	Jun-06	Bermuda	TFDE	TZ Mk. III	4	Engas
Methane Julia Louise	170,000	GasLog	Samsung	Dec-09	Bermuda	TFDE	TZ Mk. III	4	Various
Methane Kari Elin	138,200	Shell	Samsung	Jun-04	Bermuda	S	TZ Mk. III	4	Various
Methane Lake Charles	145,000	Shell	Samsung	Feb-07	Bermuda	S	TZ Mk. III	4	Marathon Oil
Methane Lydon Volney	145,000	Shell	Samsung	Aug-06	Bermuda	S	TZ Mk. III	4	Engas
Methane Mickie Harper	170,000	Shell-GasLog	Samsung	Nov-10	Bermuda	TFDE	TZ Mk. III	4	Various
Methane Nile Eagle	145,000	Shell-GasLog	Samsung	Dec-07	Bermuda	S	TZ Mk. III	4	Engas
Methane Patricia Camila	170,000	Shell-GasLog	Samsung	Oct-10	Bermuda	TFDE	TZ Mk. III	4	Various
Methane Princess	138,159	Golar LNG	Daewoo	2003	UK	S	GT No 96	4	Spot BG
Methane Rita Andre	145,000	GasLog	Samsung	Mar-06	Bermuda	S	TZ Mk. III	4	Engas
Methane Shirley Elizabeth	145,000	GasLog	Samsung	Apr-07	Bermuda	S	TZ Mk. III	4	Marathon Oil
Methane Sprit	165,000	Teekay LNG	Samsung	Mar-08	Singapore	DFDE	TZ Mk. III	4	Various
Methania	131,230	Distrigas	Boelwerf	Oct-78	Belgium	S	GT No 85	5	Sonatrach
Milaha Qatar	145,000	Milaha	Samsung	Apr-06	Denmark	S	TZ Mk. III	4	Qatar
Milaha Ras Laffan	138,270	Milaha	Samsung	Mar-04	Denmark	S	TZ Mk. III	4	RasGas II
Min Lu	147,000	China Ships	Hudong	Aug-09	China	S	GT No 96	4	Various
Min Rong	147,000	China LNG Ships	Hudong	Feb-09	Hong Kong	S	GT No 96	4	Australia-China
Mostefa Ben Boulaid	125,260	SNTM-Hyproc	La Ciotat	Aug-76	Algeria	S	TZ Mk. I	6	Sonatrach
Mourad Didouche	126,130	SNTM-Hyproc	Atlantique	Jul-80	Algeria	S	GT No 85	5	Sonatrach
Mozah	266,000	QGTC	Samsung	Aug-08	Qatar	DRL	TZ Mk III	5	Qatargas II
Mraweh	137,000	National Gas Shipping	Kvaerner-Masa	Jun-96	Liberia	S	Moss	4	ADGAS
Mubaraz	137,000	National Gas Shipping	Kvaerner-Masa	Jan-96	Liberia	S	Moss	4	Various
Muraq	210,100	J5-K Line	Daewoo	May-08	Marshall Is.	DRL	GT No 96	4	Qatar-Atl'c Basin
Murwab	210,100	J5 Consortium	Daewoo	May-08	Marshall Is.	DRL	GT No. 96	4	Qatargas
Muscat LNG	149,170	Oman Gas/MOL	Kawasaki Sakaide	Mar-04	Japan	S	Moss	4	Oman Gas
Neo Energy	149,700	Tsakos	Hyundai	Feb-07	Liberia	S	GTT Mk II	4	Various
Nizwah LNG	145,000	Oryx LNG Carriers	Kawasaki Sakaide	Dec-05	Japan	S	Moss	4	Oman Gas
Northwest Sanderling	127,525	Australia LNG	Mitsubishi Nagasaki	Jun-89	Australia	S	Moss	4	NWS
Northwest Sandpiper	127,500	Australia LNG	Mitsui Chiba	Feb-93	Australia	S	Moss	4	NWS
Northwest Seaeagle	127,450	Australia LNG	Mitsubishi Nagasaki	Nov-92	Bermuda	S	Moss	4	NWS
Northwest Shearwater	127,500	Australia LNG	Kawasaki Sakaide	Sep-91	Bermuda	S	Moss	4	NWS
Northwest Snipe	127,747	Australia LNG	Mitsui Chiba	Sep-90	Australia	S	Moss	4	NWS
Northwest Stormpetrel	127,600	Australia LNG	Mitsubishi Nagasaki	Dec-94	Australia	S	Moss	4	NWS
Northwest Swallow	127,708	J3 Consortium	Mitsui Chiba	Nov-89	Japan	S	Moss	4	NWS
Northwest Swan	138,000	Australia LNG	Daewoo	Mar-04	Australia	S	GT NO 96	4	NWS
Northwest Swift	127,590	J3 Consortium	Mitsubishi Nagasaki	Sep-89	Japan	S	Moss	4	NWS
Ob River	150,000	Lance Shipping	Hyundai	Oct-07	Marshall Is.	S	TZ Mk. III	4	Various
Onaiza	210,100	Nakilat	Daewoo	Apr-09	Liberia	DRL	GT NO 96	4	Qatar-Atlantic Basin
Pacific Arcadia	147,200	NYK Line	MHI	Oct-14	Bahamas	S	KM		Various
Pacific Enlighten	145,000	LNG MT	Mitsubishi	Mar-09	Japan	S	Moss	4	Various
Pacific Eurys	137,000	LNG Marine Transport	Mitsubishi Nagasaki	Mar-06	Bahamas	S	Moss	4	Darwin
Pacific Notus	137,006	Pacific LNG Shipping	Mitsubishi Nagasaki	Sep-03	Bahamas	S	Moss	5	Darwin
Palu LNG	160,106	TMSC Gas	Daewoo	Jun-14	Malta	TFDE	GT No 96	4	Various
Papua	171,800	MOL-China	Hudong	Jan-15	Hong Kong	DFDE	SSD	4	PNG LNG
Polar Eagle	89,880	Polar LNG	IHI Chita	Jun-93	Liberia	S	IHI SPB	4	ConocoPhillips/Marathon
Provalys	153,500	Gaz de France	Chantiers	Nov-06	France	DFDE	CS1	4	ELNG

CARRIER FLEET

Puteri Delima	130,400	MISC	Atlantique	Jan-95	Malaysia	S	GT NO 96	4	Petronas
Puteri Delima Satu	137,100	MISC	Mitsui Chiba	Apr-02	Malaysia	S	GT NO 96	4	Petronas
Puteri Firuz	130,400	MISC	Atlantique	May-97	Malaysia	S	GT NO 96	4	Petronas
Puteri Firuz Satu	137,100	MISC	Mitsubishi Nagasaki	Sep-04	Malaysia	S	GT NO 96	4	Petronas
Puteri Intan	130,400	MISC	Atlantique	Aug-94	Malaysia	S	GT NO 96	4	Petronas
Puteri Intan Satu	137,100	MISC	Mitsubishi Nagasaki	Dec-01	Malaysia	S	GT NO 96	4	Petronas
Puteri Mutiera Satu	137,100	MISC	Mitsui Chiba	Apr-05	Malaysia	S	GT NO 96	4	Petronas
Puteri Nilam	130,400	MISC	Atlantique	Jun-95	Malaysia	S	GT NO 96	4	Petronas
Puteri Nilam Satu	137,100	MISC	Mitsubishi Nagasaki	Sep-03	Malaysia	S	GT NO 96	4	Petronas
Puteri Zamrud	130,400	MISC	Atlantique	May-96	Malaysia	S	GT NO 96	4	Petronas
Puteri Zamrud Satu	137,100	MISC	Mitsui Chiba	Apr-87	Malaysia	S	GT NO 96	4	Atlantic LNG
Raahi	136,000	Petronet LNG Ltd	Daewoo	Dec-04	Malta	S	GT NO 96	4	Qatargas
Ramdane Abane	126,130	SNTM-Hyproc	Atlantique	Jul-81	Algeria	S	GT NO 85	5	Sonatrach
Rasheeda	266,000	QGTC	Samsung	Jun-10	Liberia	DRL	TZ Mk. III		Various
Ribera del Duero Knutsen	173,400	Knutsen	Daewoo	Nov-10	Nor-NIS	DFDE	GT NO. 96	4	Various
Salalah LNG	147,000	Oman Gas/MOL	Samsung	Dec-05	Japan	S	TZ Mk. III	4	Oman
SCF Polar	71,500	Sovcomflot	Kockums	Aug-69	Liberia	S	GT NO 82	6	Sonatrach
Seishu Maru	162,000	K Line-Transpacific	Kawasaki Sakaide	Jan-15	Panama	S	Moss	4	Australia-Japan
Seri Alam	138,000	MISC	Samsung	Oct-05	Malaysia	S	TZ Mk. III	4	Yemen LNG
Seri Amanah	145,000	MISC	Samsung	Mar-06	Malaysia	S	TZ Mk. III	4	Yemen LNG
Seri Anggun	145,000	MISC	Samsung	Nov-06	Malaysia	S	TZ Mk. III	4	Yemen LNG
Seri Angkasa	145,000	MISC	Samsung	Feb-07	Malaysia	S	TZ Mk. III	4	Petronas
Seri Ayu	145,000	MISC	Samsung	Oct-07	Malaysia	S	TZ Mk. III	4	Various
Seri Bakti	152,300	MISC	Mitsubishi	Mar-07	Malaysia	S	GT NO 96	4	Petronas
Seri Balhaf	152,000	MISC	Mitsubishi	Sep-08	Malaysia	S	GT NO 96	4	Various
Seri Balquis	152,000	MISC	Mitsubishi	Dec-08	Malaysia	S	GT NO 96	4	Various
Seri Begawan	152,300	MISC	Mitsubishi	Dec-07	Malaysia	S	GT NO 96	4	Various
Seri Bijaksana	152,300	MISC	Mitsubishi	Feb-08	Malaysia	S	GT NO 96	4	Petronas
Sestao Knutsen	138,000	Knutsen	IZAR Sestao	Jan-07	Spain	S	GT NO 96	4	Atlantic LNG
Sevilla Knutsen	173,400	Knutsen	Daewoo	Jun-10	N.I.S.	DFDE	GT NO 96	4	Various
Shahamah	135,500	National Gas Shipping	Kawasaki Sakaide	Oct-94	Liberia	S	Moss	5	ADGAS
Shangra	266,000	QGTC	Samsung	Nov-09	Liberia	DRL	TZ Mk. III	5	Qatargas IV
Shen Hai	147,100	China LNG	Hudong Zhonghua	Sep-12	China	AB/CC Steam	GT NO 96	4	Various
Simaisma	147,700	Maran Gas Maritime	Daewoo	Jul-06	Greece	S	GT No 96	4	Qatar
SK Splendor	138,375	SK Shipping	Samsung	Mar-00	Panama	S	TZ Mk. III	4	Oman Gas
SK Stellar	138,375	SK Shipping	Samsung	Dec-00	Panama	S	TZ Mk. III	4	RasGas
SK Summit	138,000	SK Shipping	Daewoo	Aug-99	Panama	S	GT NO 96	4	RasGas
SK Sunrise	138,306	I. S. Carriers	Samsung	Sep-03	Panama	S	TZ Mk. III	4	RasGas
SK Supreme	138,200	SK Shipping	Samsung	Jan-00	Panama	S	TZ Mk. III	4	RasGas
Sohar LNG	137,250	Oman Gas/ MOL	Mitsubishi Nagasaki	Oct-01	Malta	S	Moss	5	Oman Gas
Solaris	155,000	GasLog	Samsung	Jul-14	Bermuda	TFDE	TZ Mk. III	4	Various
Sonangol Benguela	160,500	Sonangol	Daewoo	Sep-11	Bahamas	S	GT No. 96	4	Angola LNG
Sonangol Etosha	160,500	Sonangol	Daewoo	Sep-11	Bahamas	S	GT No. 96	4	Angola LNG
Sonangol Sambizanga	160,500	Sonangol	Daewoo	Sep-11	Bahamas	S	GT No. 96	4	Angola LNG
Southern Cross	172,000	MOL	Hudong	May-15	Hong Kong	DRL	GT NO. 96	4	Various
Soyo	160,400	Mitsui/NYK/Teekay	Samsung	May-11	Bahamas	DFDE	TZ Mk. III	4	Various
Spirit of Hela	177,000	MOL	Hyundai	Oct-09	Panama	DFDE	TZ Mk. III	4	Various
Stena Blue Sky	145,700	Stena	Daewoo	Jan-06	Panama	S	GT No 96	4	Various
Stena Clear Sky	171,800	Stena	Daewoo	Sep-10	Panama	DFDE	GT NO 96	4	Various
Stena Crystal Sky	171,800	Stena	Daewoo	Jul-10	Panama	DFDE	GT NO 96	4	Various
STX Kolt	145,700	STX Panocean	Korea Hanjin	Nov-08	Panama	DFDE	TZ Mk. III	4	Various
Suez Point Fortin	154,200	Trinity LNG	Koyo Japan	Nov-09	Panama	S	TZ Mk. III	4	Yemen LNG
Taitar No. 1	145,000	NYK Line	Mitsubishi	Oct-09	Liberia	S	Moss	4	Various
Taitar No. 3	145,000	NYK Line	Mitsubishi	Jan-10	Liberia	S	Moss	4	Various
Taitar No. 4	145,000	NYK	Mitsubishi	Jan-10	Liberia	S	Moss	4	Various
Tangguh Batur	145,700	Sovcomflot/NYK	Daewoo	Dec-08	Cyprus	S	GT NO 96		Tangguh
Tangguh Foja	155,000	K Line	Samsung	Jul-08	Panama	DFDE	TZ Mk. III	4	Tangguh LNG
Tangguh Hiri	155,000	Teekay LNG	Hyundai	Nov-08	IOM	DFDE	TZ Mk. III	4	Tangguh
Tangguh Jaya	145,700	K Line	Samsung	Nov-08	Panama	DFDE	TZ Mk. III	4	Tangguh
Tangguh Palung	155,000	K Line	Samsung	Mar-09	Panama	DFDE	TZ Mk. III	4	Tangguh
Tangguh Sago	155,000	Teekay LNG	Hyundai	Mar-09	IOM	DFDE	TZ Mk. III	4	Tangguh LNG
Tangguh Towuti	145,700	Sovcomflot/NYK	Daewoo	Oct-08	Cyprus	S	GT NO 96	4	Tangguh
Tembek	216,200	OSG/Nakilat	Samsung	Sep-07	Marshall Is.	DRL	TZ Mk. III	4	Qatargas II
Tenaga Satu	130,000	MISC	Dunkerque	Sep-82	Malaysia	S	GT NO 88	5	Petronas
Trinity Arrow	154,900	K Line	Imabari Shipbuilding	Mar-08	Panama	S	TZ Mk. III	4	Various
Umm Al Amad	210,100	J5	Daewoo	Aug-08	Marshall Is.	DRL	GT NO 96	4	Ras Gas III
Umm Al Ashtan	137,000	National Gas Shipping	Kvaerner- Masa	May-97	Liberia	S	Moss	4	ADGAS
Umm Bab	145,000	Kristen Navigation	Daewoo	Nov-05	Bermuda	S	GT NO 96	4	Qatargas
Umm Slaal	266,000	QGTC	Samsung	Nov-08	Qatar	DRL	TZ Mk. III	5	Qatargas
Valencia Knutsen	173,400	Knutsen	Daewoo	Sep-10	Nor-NIS	DFDE	GT NO. 96	4	Various
Velikiy Novgorod	170,200	SovComFlot	STX	Feb-14	Liberia	DFDE	GT No. 96	4	Various
Wakaba Maru	125,000	J3 Consortium	Mitsui Chiba	Apr-85	Japan	S	Moss	5	Pertamina
WilEnergy	125,500	Awilco LNG	Mitsubishi	Oct-83	NIS	S	Moss	5	Various
WilForce	156,000	Teekay LNG	Daewoo	Aug-13	NIS	DFDE	GT NO 96	4	Various
WilGas	125,500	Awilco LNG	Mitsubishi	Jul-84	NIS	S	Moss	5	Various
WilPower	125,500	Awilco LNG	Mitsubishi	Jul-84	NIS	S	Moss	5	Various
Woodside Donaldson	165,500	Teekay LNG	Samsung	Dec-09	Singapore	DFDE	TZ Mk. III	4	Various
Woodside Goode	159,800	Maran	Daewoo	Jul-14	Greece	DFDE	GT No. 96	4	Various
Woodside Rogers	155,900	Maran Gas	DSME	Jul-13	Greece	DFDE	GT NO 96	4	Various
Yari LNG	159,983	TMSC Gas	Daewoo	Jun-14	Malta	TFDE	GT No 96	4	Various
Yenisei River	155,000	Dynagas	Hyundai	Jul-13	Marshall Is.	DFDE	TZ Mk. III	4	Various
YK Sovereign	127,125	SK Shipping	Hyundai	Dec-94	Panama	S	Moss	4	Pertamina
Zarga	266,000	QGTC	Samsung	Dec-09	Liberia	DRL	TZ Mk. III	5	Qatar-Atlantic
Zekreet	135,420	J4 Consortium	Mitsui Chiba	Dec-98	Japan	S	Moss	5	Qatargas

Any observations, additions or suggested revisions to the LNG journal World LNG Carrier Fleet list should be sent to editor@lngjournal.com

LNG Import Terminals

Explanatory Notes

- The tables do not include the following types of LNG facilities :
 - ♦ Small marine satellite terminals receiving LNG from liquefaction plants in their own country (such as exist in Norway) or which receive LNG transhipped from nearby reception terminals in their own country (such as in Japan)
 - ♦ Satellite LNG storage facilities that receive LNG transported only by road or rail
- Expansions of LNG reception terminals are only shown if they involve new storage tanks
- Where there is a blank in the table the information is uncertain or unknown.

Any comments on the tables, and corrections / additional information from terminal shareholders and project developers would be most welcome, and should be sent to [John McKay e-mail editor@lngjournal.com](mailto:John.McKay@lngjournal.com)

Country	Location (Project)	Owners	Start up	Storage	
				Tanks	Capacity
Belgium	Zeebrugge	Fluxys	1987	4	380,000
Canada	Canaport Saint John	Irving Oil, Repsol	2009	3	480,000
Chile	Quintero	ENAP, Metrogas, Enagas	2009	3	334,000
	Mejillones	Engie, Codelco	2010	1	175,000
China	Beihai LNG, Guangxi	Sinopec	2015	2	320,000
	Dalian	PetroChina	2011	3	480,000
	Dongguan, Guangdong	Jovo Group	2013	2	160 000
	Fujian LNG (Xiuyu)	CNOOC, Fujian I&D Corp.	2008	2	640,000
	Guangdong	CNOOC,BP	2006	3	480,000
	Haikou, Hainan LNG	CNOOC	2014	3	480,000
	Ningbo, Zhejiang	CNOOC, Zhejiang Energy	2012	3	480,000
	Qingdao, Shandong	Sinopec	2014	3	480,000
	Rudong	PetroChina	2011	2	320,000
	Shanghai	CNOOC, Shenergy Group	2009	3	495,000
	Shanghai, Mengtougou	Shanghai Gas	2008	3	120 000
	Tangshan, Hebei	PetroChina	2013	3	480,000
	Tianjin FSRU	CNOOC	2014	1	60,000
	Zhuhai, Gaolan	CNOOC	2013	3	480,000
Dominican Republic	Punta Caucedo	AES Andres	2003	1	160 000
France	Fos Tonkin	Elengy	1972	3	150,000
	Montoir-de-Bretagne	Elengy	1980	3	360,000
	Fos Cavaou	Engie, Total	2010	3	330,000
	Dunkirk LNG	EDF, Fluxys, Total	2016	3	570,000
Greece	Revithoussa	DEPA	2000	2	130,000
India	Dabhol	GAIL, NTPC (Ratnagiri Gas & Power)	2009	3	480,000
	Dahej	Petronet LNG	2004	4	592,000
	Hazira	Shell India, Total	2005	2	320,000
	Kochi, Kerala	Petronet LNG	2013	2	320,000
Indonesia	Arun	Pertamina	2015	5	507,000
Italy	Panigaglia	Snam	1969	2	100,000
	Porto Levante (offshore GBS)	ExxonMobil, Qatar Petroleum, Edison Gas	2009	2	250,000
Japan	Negishi	Tokyo Gas	1969	14	1,180,000
	Sodegaura	Tokyo Gas	1973	35	2,660,000
	Ohgishima	Tokyo Gas	1998	4	850,000
	Higashi-Ohgishima	Tokyo Electric	1984	9	540,000
	Futtsu	Tokyo Electric	1985	10	1,110,000
	Yokkaichi LNG	Chubu Electric	1988	4	320,000
	Kawagoe	Chubu Electric	1997	6	840,000
	Yokkaichi Works	Toho Gas	1991	2	160,000
	Chita LNG Joint	Toho Gas, Chubu Electric	1978	4	300,000
	Chita LNG	Toho Gas, Chubu Electric	1983	7	640,000
	Chita - Midorihama	Toho Gas	2001	2	400,000
	Senboku I	Osaka Gas	1972	4	180,000
	Senboku II	Osaka Gas	1977	18	1,585,000
	Himeji	Osaka Gas	1984	8	740,000
	Himeji LNG	Kansai Electric	1979	7	520,000
	Yanai	Chugoku Electric	1990	6	480,000
	Niigata	Nihonkai LNG, Tohoku Electric	1984	8	720,000
	Oita	Oita Gas, Kyushu Electric	1990	5	460,000
	Tobata	Kitakyushu LNG	1977	8	480,000
	Fukuoka	Saibu Gas	1993	2	70,000
	Sodeshi	Shizuoka Gas	1996	3	337,200
	Hatsukaichi	Hiroshima Gas	1996	2	170,000
	Kagoshima	Nippon Gas	1996	2	136,000
	Shin-Minato	Sendai City Gas	1997	1	80,000
	Nagasaki	Saibu Gas	2003	1	36,000
	Sakai	Kansai Electric, Cosmo Oil	2006	3	420,000
	Mizushima	Nippon Oil, Chugoku Electric	2006	2	320,000
	Sakaide	Shikoku Electric, Cosmo Oil	2011	1	180,000
	Ishikari LNG	Hokkaido Gas, Tokyo Gas	2012	1	180,000
	Okinawa	Okinawa Electric Power	2012	2	280,000
	Naoetsu	Inpex	2013	2	360,000
	Joetsu	Chubu	2011	3	540,000
	Hachinohe LNG	Nippon Oil	2015	2	280,000
	Hitachi LNG	Tokyo Gas	2015	1	230,000
Korea	Incheon	Kogas	1996	20	2,880,000
	Kwangyang	POSCO	2005	4	530,000
	Pyeong-Taek	Kogas	1986	23	3,360,000
	Samcheok	Kogas	2014	3	600,000
	Tong-Yeong	Kogas	2002	17	2,620,000
Mexico	Altamira	Vopak, Enagas	2006	2	300,000
	Energia Costa Azul	Sempre LNG	2008	2	320,000
	Manzanillo	Samsung, Kogas, Mitsui	2012	2	300,000
Netherlands	Gate LNG	Gasunie, Royal Vopak	2011	3	540,000
Poland	Swinoujscie	Baltic Gaz System	2015	2	320,000
Portugal	Sines	REN Atlantico	2004	3	390,000
Puerto Rico	Penuelas	EcoElectrica	2000	1	160,000

LNG Import Terminals (continued)

Country	Location (Project)	Owners	Start up	Storage	
				Tanks	Capacity
Singapore	Singapore	Singapore Energy Authority	2013	3	540,000
Spain	Barcelona	Enagas	1969	8	840,000
	Huelva	Enagas	1988	5	610,000
	Cartagena	Enagas	1989	5	587,000
	Bilbao	Enagas, EVE	2003	3	450,000
	Sagunto	GNF, Osaka Gas, Oman Oil	2006	4	600,000
	Reganosa, Ferrol	Galicia, Sonatrach, Tojeiro	2006	2	300,000
	El Musel, Gijón,	Enagas	2013	2	300,000
	Yung-An	CPC	1990	6	690,000
Taiwan	Tai-chung	CPC	2009	3	480,000
Thailand	Map Ta Phut	PTT LNG	2011	2	320,000
Turkey	Marmara Ereglisi	Botas	1994	3	255,000
	Izmir	EgeGaz	2006	2	280,000
USA	Everett	Suez LNG NA	1971	2	155,000
	Lake Charles	Shell, ETE	1982	4	425,000
	Elba Island	Kinder	2001	5	535,000
	Cove Point	Dominion	2003	5	530,000
	Freeport	Freeport LNG Development	2008	2	320,000
	Cameron	Sempra LNG	2009	3	480,000
	Golden Pass, TX	Qatar Petroleum, ExxonMobil	2010	5	775,000
	Pascagoula, MS	Gulf LNG, Kinder	2012	2	320,000
UK	Isle of Grain	National Grid	2005	8	1,000,000
	South Hook	ExxonMobil, Qatar Petroleum, Total	2009	5	775,000
	Dragon LNG, Milford Haven	Shell, Petronas	2009	2	310,000

LNG Import Terminal Projects

Country	Location/Project	Owners/Project Developers	Start up	Storage	
				Tanks	Capacity
China	Swatuo, Guangdong	CNOOC	2016	2	320,000
	Yingkou, Liaoning	CNOOC	2016	2	320,000
	Qidong, Jiangsu	Shell-Guanghui	studies		
	Yuedong LNG, Jieyang, Guangdong	CNOOC	2016	2	320,000
	Tianjin North	Sinopec	2017	2	320,000
Finland	Pori	Gasum Skangass	2016	1	30,000
	Tornio	Gasum, Skangass	2018	1	30,000
India	Ennore	Indian Oil Corp	2016	2	320,000
	Mundra	Gujarat State Petroleum, Adani Group	2016	2	320,000
	FSRU Andhra Pradesh	Engie, Andhra Pradesh Gas	2016	1	135,000
	Pipovav LNG (FSRU), Gujarat	Swan Energy	2016	2	320,000
Indonesia	Labuhan Maringgai	Perusahaan Gas Negara	2016	1	135,000
Japan	Soma, Fukushima	Japan Petroleum	2017	1	230,000
Malaysia	Lahad Datu LNG, Sabah	Petronas	2016	studies	
Philippines	Pagbilao LNG	Energy World Corp.	2016	1	130,000
UAE (FSRU)	Fujairah	Mubadala	2016	1	135,000
UK	Port Meridian, Barrow-in-Furness	Port Meridian Energy Ltd.	2016	1	150,000
Uruguay FSRU	Montevideo	Gas Sayago, Mitsui Osk Lines	2017	1	230,000

LNG FSRU Import Facilities

Country	Location (Project)	Owners	Start up
Argentina	Bahia Blanca GasPort	Excelerate/YPF Repsol	2008
	Escobar GasPort	Excelerate/Enarsa	2011
Brazil	Pecem, FSRU	Petrobras	2009
	Guanabara Bay FSRU	Petrobras	2009
	Salvador, Bahia FSRU	Petrobras	2013
Dubai	Jebel Ali Port	DSA of UAE	2010
Egypt	Ain Sokhna, Suez	EGAS, Hoegh	2015
	Ain Sokhna, Suez	EGAS, Golar	2015
Indonesia	Lampung	Hoegh LNG, PGN LNG	2014
	Nusantara (Jakarta Bay)	Golar LNG, Pertamina	2012
Italy	Livorno	OLT Offshore LNG Toscana	2013
Jordan	Aqaba, Jordan	Golar LNG	2015
Kuwait	Mina Al-Ahmadi	KPC	2009
Lithuania	Klaipeda	Klaipedos Nafta Hoegh LNG	2014
Malaysia	Malacca FSRU	Petronas	2012
Pakistan	Port Qasim	Excelerate, Engro Corp	2015
UK	Teesside GasPort	Excelerate	2007

LNG Export Projects

Country	Location/Project	Project Developers	Planned Start Up	Number of Trains	Capacity In MTPA
AUSTRALIA	Browse LNG	Woodside, BHP, BP Chevron, Shell, Mitsubishi, Mitsui	2018+	2	10.0
	Ichthys LNG	INPEX, Total	2017	2	8.4
	Prelude FLNG	Shell, Inpex, Kogas CPC	2017	1	3.5
	Sunrise LNG	Woodside, Osaka Gas, ConocoPhillips, Shell	2020+	1	3.5
	Wheatstone LNG	Chevron, Apache, Shell , Kuwait FPEC	2017	2	9.0
CANADA	Aurora LNG BC	CNOOC, Inpex Corp. and JGC Corp.	2020	4	24.0
	Bear Head LNG, Nova Scotia	LNG Ltd.	2020	4	8.0
	Canaport LNG, New Brunswick	Repsol Irving Oil	2020	studies	
	Cedar 1, 2, 3, Kitimat area	LNG Export Ltd (Haisla)	2020	studies	
	Douglas Channel LNG Bish Cove	Exmar, EDF, ItaGas, Idemitsu	2018	1	1.0
	GNL Quebec, Saquenay	Freestone Capital and Breyer Capital	2020	4	10.0
	Goldboro LNG, Nova Scotia	Pieridae Energy	2020	2	10.0
	Grassy Point LNG	Woodside Petroleum	2020	studies	
	Kitimat LNG, BC	Woodside, Chevron	2020	2	10.0
	LNG Canada, BC	Shell, Mitsubishi, Kogas, PetroChina	2020	2	12.0
	Melford LNG project, Nova Scotia	H-Energy Hiranandani Group	Studies		
	Pacific Northwest LNG, BC	Petronas, Japex, Sinopec, Indian Oil, Brunei Petroleum	2019	2	12.0
	Shell Prince Rupert LNG, BC	Shell	2020	3	21.0
	Steelhead LNG, Bamfield	Steelhead LNG Corp	2020	2	12.00
	Vancouver Tilbury	WesPac Midstream	2020	1	3.25
EQ.GUINEA	Equatorial Guinea Fortuna FLNG	Ophir and Golar LNG	2019	1	2.0
INDONESIA	Abadi FLNG	Inpex, Shell	2019	2	7.5
	Sengkang LNG	Energy World Corp.	2016	4	2.0
MALAYSIA	Bintulu Train 9	Petronas	2016	1	3.6
	Kanowit FLNG (Sarawak)	Petronas	2016	1	1.2
	Rotan FLNG (Sabah)	Petronas	2017	1	1.5
MOZAMBIQUE	Area 1 Onshore	Anadarko Petroleum and partners	2018	2	10
	Area 4 Onshore	Eni and partners	2020	2	10
	Area 4 FLNG	Eni and partners	2019	1	2.5
NIGERIA	NLNG Train 7	NNPC, Shell, BP, Total	2020+	1	8.4
	Olokola LNG	NNPC, Chevron, Shell	2020+	4	20.0
PAPUA NEW GUINEA	Elk-Antelope LNG	Total, InterOil, Oil Search, Petromin	Studies		
RUSSIA	Shtokman LNG Murmansk	Gazprom, Statoil, Total	2020	4	20.0
	Yamal LNG Siberia	Novatek, Gazprom, Total	2018	3	16.5
	Sakhalin II expansion	Gazprom, Shell, Mitsui, Mitsubishi	2020	studies	
	Vladisvostok LNG	Gazprom, Itochu, various	2020	2	10.0
USA	Alaska LNG Nikiski	ExxonMobil, BP, ConocoPhillips, Alaska State	2020	3	20.0
	Annova LNG, Brownsville	Exelon Corp.	2020	6	6.0
	Cameron LNG, Louisiana	Sempra	2018	5	24.92
	Corpus Christi Liquefaction, Texas	Cheniere	2019	5	22.5
	Cove Point LNG, Maryland	Dominion	2018	1	5.25
	Delfin LNG Louisiana	Delfin, Hoegh	2020	3	9.0
	Freeport LNG, Texas	Freeport LNG	2018	4	20.4
	Golden Pass, Texas	Qatar Petroleum, ExxonMobil	2020	3	15.6
	Jordan Cove Energy	Veresen Inc.	2020	2	6.8
	Lake Charles, Louisiana	Shell, ETE	2019	3	15.0
	Live Oak LNG	Parallax	2020	1	5.0
	Louisiana LNG Energy (Mississippi R.)	Parallax, Cheniere	2020	3	6.0
	Magnolia LNG	Louisiana LNG Ltd.	2019	4	8.0
	Oregon LNG	Leucadia Corp.	2020	2	9.6
	Port Arthur LNG	Sempra	2020	2	10.0
	Rio Grande LNG	NextDecade	2020	6	27.0
	Sabine Pass LNG, Louisiana	Cheniere	2016-19	5	22.5
	Southern LNG	Kinder Morgan	2019	4	2.0
	Texas LNG Brownsville	Chandra, Meyer, Samsung, others	2020	2	4.0
	VG LNG (Cameron Parish)	Venture Global	2019	10	10.0
	VG LNG (Plaquemines)	Venture Global	2019	10	20

LNG Exporters

Country	Location/Project	Shareholders	Start up	Liquefaction		Storage	
				Trains	capacity (nominal) mtpa	No. of tanks	Total capacity m³
ABU DHABI (UAE)	Das Island (Adgas)	ADNOC, Mitsui, BP, Total	1977 1994	2 1	3.2 2.5	3	240,000
ALGERIA	Arzew	Sonatrach GL4Z	1964	3	1.1	3	35,000
	Arzew	Sonatrach GL1Z	1978	6	7.8	3	300,000
	Arzew	Sonatrach GL2Z	1980	6	8.0	3	300,000
	Arzew	Sonatrach	2014	1	4.7		
	Skikda	Sonatrach GL1K II	1980	3	3.0	5	308,000
	Skikda	Sonatrach (rebuild)	2013	1	4.5		
ANGOLA	Soyo	Sonangol, Chevron, BP, ENI, Total	2012	1	5.2	2	370,000
AUSTRALIA	Karratha	NWS Woodside, Shell, BHP	1989	2	5.0	4	260,000
		(BP, Chevron	1992	1	2.5	1	130,000
		(Mistubishi/Mitsui)	2004	1	4.4	1	130,000
		NWS partners	2008	1	4.4	1	130,000
		Darwin (Bayu Undan) ConocoPhillips, Santos, Eni, Inpex, TEPCO, Tokyo Gas	2006	1	3.5	1	188,000
	Australia Pacific LNG Gladstone LNG Gorgon LNG Pluto LNG QCLNG	ConocoPhillips, Origin Energy, Sinopec	2016	2	7.5	2	320,000
		Santos, Petronas, Total, Kogas	2015	2	7.8	2	280,000
		Chevron, Shell, ExxonMobil	2016	3	15.6	2	360,000
		Woodside, Tokyo Gas, Kansei	2012	1	4.8	2	240,000
		Shell, CNOOC	2014	2	8.0	2	280,000
BRUNEI	Lumut	Brunei/Shell/Mitsubishi/Total	1972-74	5	7.2	3	176,000
EGYPT	Damietta	Union Fenosa, EGPC, EGAS	2004	1	5.0	2	300,000
	Idku	EGPC, EGAS, Shell, Engie, Petronas	2005	2	7.2	2	280,000
EQ.GUINEA	Bioko Island	Marathon, Sonagas, Mitsui, Marubeni	2007	1	3.4	2	272,000
INDONESIA	Bontang I	Pertamina, VICO, JILCO, Total	1977	2	5.2	5	635,000
	Bontang II		1983	2	5.2		
	Bontang III		1989	1	2.8		
	Bontang IV		1993	1	2.8		
	Bontang V		1997	1	2.8		
	Bontang VI		1999	1	3.0		
	Sulawesi LNG	Medco Energi, Pertamina, Mitsubishi	2015	1	2.0	1	170,000
	Tangguh	BP, MI Berau, CNOOC, Nippon, LNG Japan	2008	2	7.6	2	340,000
LIBYA	Marsa el Brega	Sirte Oil (NOC/Shell upgrading)	1970	2	(2.5)	2	96,000
MALAYSIA	Bintulu (MLNG Satu)	Petronas, Sarawak, Mitsubishi	1983	3	8.1	4	260,000
	Bintulu (MLNG Dua)	Petronas, Shell, Sarawak, Mitsubishi	1995	3	7.8	1	65,000
	Bintulu (MLNG Tiga)	Petronas, Shell, Sarawak, Mitsubishi, Nippon Oil	2003	2	6.8	1	120,000
NIGERIA	Bonny Island	NNPC, Shell, Total, Eni	1999	2	6.4	2	168,400
		Nigeria LNG (formed by above)	2002	1	3.2	1	84,200
		Nigeria LNG	2006	2	8.2		
		Nigeria LNG	2008	1	4.1	1	84,200
NORWAY	Snøhvit/Melkoya Island	Statoil, Total, GDF-Suez, Petoro	2007	1	4.2	2	280,000
OMAN	Oman LNG	Oman Govt., Shell, Total, Korea LNG	2000	2	7.1	2	240,000
		Mitsubishi, Mitsui, Partex and Itochu					
		Oman Govt., Oman LNG Union Fenosa, Osaka Gas, & Itochu	2006	1	3.7	2	240,000
PAPUA NEW GUINEA	PNG LNG	ExxonMobil, Oil Search, Santos, JX Nippon Oil	2014	2	6.9	2	320,000
PERU	Peru LNG	Hunt Oil, Shell, Marubeni, SK Group	2010	1	4.4	2	260,000
QATAR	Qatargas 1-T1&2	QP, ExxonMobil, Total, Marubeni, Mitsui	1997	2	6.4	4	340,000
	Qatargas 1-T3	QP, ExxonMobil, Total, Marubeni, Mitsui	1999	1	3.1		
	Qatargas II-T1	QP, ExxonMobil	2009	1	7.8		
	Qatargas II-T2	QP, ExxonMobil, Total	2009	1	7.8	8	1,160,000
	Qatargas III-T1	QP, ConocoPhillips, Mitsui	2010	1	7.8		
	Qatargas IV-T1	QP, Shell	2010	1	7.8		
	RasGas I- T1&2	QP, ExxonMobil, Kogas, Itochu, LNG Japan	1999	2	6.6		
	RasGas II- T3	QP, ExxonMobil	2004	1	4.7	6	840,000
	RasGas II- T4	QP, ExxonMobil	2005	1	4.7		
	RasGas II- T5	QP, ExxonMobil	2007	1	4.7		
	Rasgas III – T6	QP, ExxonMobil	2009	1	7.8		
	Rasgas III – T7	QP, ExxonMobil	2010	1	7.8		
RUSSIA	Sakhalin Island	(Sakhalin Energy) Gazprom, Shell, Mitsui, Mitsubishi	2009	2	9.6	2	200,000
TRINIDAD & TOBAGO	Point Fortin Train 1	BP, Shell, Suez, NGC	1999	1	3.0	2	204,000
	Train 2	BP, Shell	2002	1	3.3	1	160,000
	Train 3	BP, Shell	2003	1	3.3	1	160,000
	Train 4	BP, Shell, NGC	2005	1	5.2	1	160,000
USA	Cheniere Sabine Pass	Cheniere Energy	2016	1	4.5	5	800,000
	Kenai - Alaska	ConocoPhillips, Marathon Oil	1969	2	1.3	3	108,000
YEMEN	Bal-Haf	Yemen LNG, Total, Yemen Gas, Hunt Oil, SK Group, Hyundai	2009	2	6.7	2	320,000

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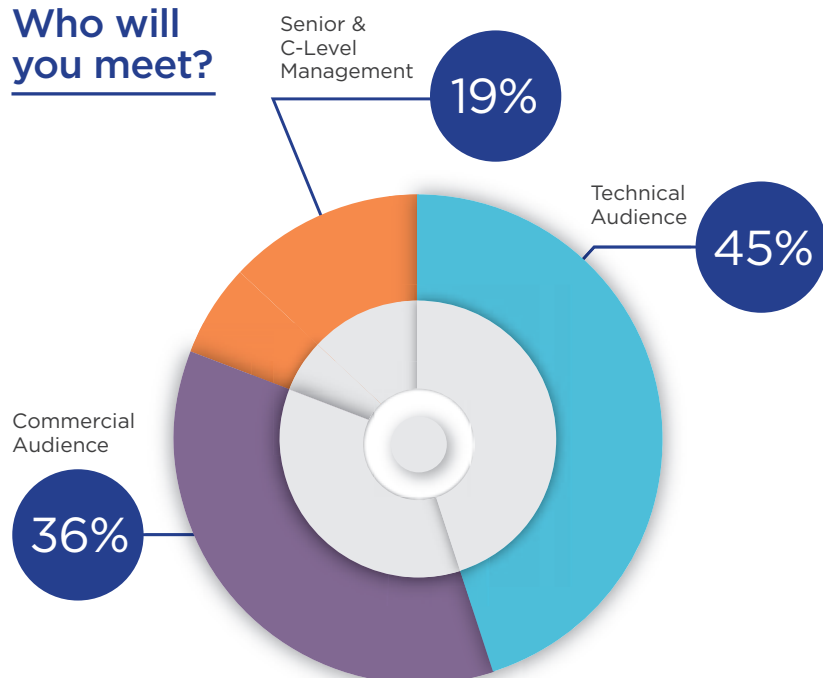
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